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Cranial Stress in the Fœtus during Labour and on the effects of Excessive Stress on the Intracranial Contents; with an analysis of eighty-one cases of Torn Tentorium Cerebelli and Subdural Cerebral Hæmorrhage.[1]

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THE frequent discovery of tears of the dura mater septa, associated with subdural cerebral hæmorrhage, in fœtuses dying during the course of labour, was one of the most striking features of this investigation.[2] Out of 167 fresh fœtuses the tentorium cerebelli was found torn in 81 (48 per cent.), associated with tearing of the falx cerebri in five cases and with subdural cerebral hæmorrhage in all but six. Most were the result of breech or forceps delivery, or of delivery through a contracted pelvis, but a few resulted from apparently normal labour. (These cases, with their more important details, are arranged in the table at the end.)

I am convinced that a proper understanding of the events which lead to these injuries, and of the manner in which they arise, will enable many cases of them to be avoided and fœtal mortality to be correspondingly reduced. I propose, therefore, to discuss at

1. This paper forms Section V of my "Report on the Causation of Fœtal Death," being the Ministry of Health Report on Public Health and Medical Subjects, No. 7. The investigations embodied in this report were made under a research-grant from the Ministry of Health, to whom acknowledgment is made for permission to publish this paper here.—E. H.

2. Tearing of the fœtal tentorium cerebelli was originally described by Professor Beneke in 1910 (*Münch. med. Woch.*, lvii, 41, 1910). Since then there have been other papers on the same subject (notably by Meyer and Hauch, *Arch. mens. d'Obst. et de Gyn.*, March, 1922; Pott, *Zeitschr. f. Geb. u. Gyn.*, lxix, 3, 1911; Moreno, *Arch. mens. d'Obst. et de Gyn.*, April, 1915. But the great frequency and extreme importance of these injuries have not hitherto received due recognition, and the mechanics of the fœtal cranium and the nature of the stresses and strains which result in these injuries have not been appreciated.—E. H.

some length the forces which act on the fœtal head and the injuries they produce in the intracranial contents. In other words, to consider the stress to which the head is subjected and the strains from which it suffers.

The subject will be dealt with according to the following plan:

I.—Some points in cranial mechanics.
- (*a*) A general consideration of cranial stresses and strains.
- (*b*) On alteration in the shape of the head, or moulding.
- (*c*) On the effect on the dura mater septa of alterations in the shape of the head.

II.—The anatomy of the dura mater septa, especially as regards the presence of stress-bands and stress-lines.

III.—The morbid anatomy of tears of the septa as found in 81 fœtuses.

IV.—The mode of origin and source of subdural cerebral hæmorrhage.

V.—Clinical part: analysis of the 81 cases.

VI.—Tabular summary of the 81 cases.

I.—On some Points in Cranial Mechanics.

(*a*) *A General Consideration of Cranial Stresses and Strains.*

During its passage through the birth-canal the fœtal head is subjected to the action of compressive forces, which are the resultant between the powers of labour and the resistance of the maternal passages. The head is, therefore, in a state of stress during labour, and this state may be conveniently termed "cranial stress."

Cranial stress is a compound compressive stress which may be roughly regarded as consisting of two elements, (1) a general compression of the whole head, and (2) a simple longitudinal compression by opposite forces acting at the ends of the long diameter of engagement of the head in the pelvis. It is this element of simple longitudinal stress which is of such special importance in its effects on the cranium and intracranial contents, and which is chiefly responsible for alteration in the shape of the head and stretching of the septa of the dura mater. As the head may engage in any diameter lying between extreme flexion and extreme extension, this longitudinal stress may occur in one of many directions, but as regards their effects on the head these directions may be resolved into two (1) antero-posterior; along the diameters lying between the occiput and the forehead, as in vertex and breech presentations, and (2) vertical, along the diameters lying

between the vault and base of the cranium, as in face and brow presentations.

It is obviously impossible, during the course of labour in any given case, to analyze the exact nature of cranial stress, to measure accurately its intensity, or to predict its effects. For practical purposes no more can be said than that the stresses and their effects vary chiefly with (1) the absolute amount of the forces acting on the head at any given time, (2) the direction in which these forces act on different parts of the head, (3) the degree of plasticity, or ductility, of the head, and (4) whether the forces attain their maximum effect suddenly or gradually. The only means of estimating the intensity of cranial stress is by observing its effects after birth. Cranial stress may be normal or excessive; even in the easiest labours the head is, of course, subjected to a certain amount of stress. Normal stress leaves no observable effect, or merely a moderate alteration in shape; excessive stress results in an excessive degree of moulding, or, as I shall show later, in the infinitely more important effects of overstretching and tearing of the tentorium cerebelli and falx cerebri, and rupture of certain blood vessels. Tearing of the tentorium and falx is clear evidence of excessive cranial stress and forms the best and simplest means of estimating, post mortem, the degree of stress to which the head has been subjected. Excessive cranial stress is responsible for fœtal death to an extent hitherto little suspected.

On the Effects of Cranial Stress.—The effect of stress is strain. Without entering into a technical discussion on strain it may be stated that all strains can be analyzed into (*a*) slides or shearing strains, (*b*) stretches. A slide consists in the change of shape of a body without change of size, the familiar illustration of which is to change the shape of a book from a rectangular to an oblique shape by pressing against the long edge of one of its covers. In fœtal heads which have been subjected to stress both these classes of strain may be found; the moulding of the fœtal head is an example of a "slide," and the tearing of the septa of the dura mater is an example of a " stretch."

The effects of a given stress on a body depend, of course, on the material of which it is composed and on its construction. If we now consider the fœtal head as a body exposed to stress, and try to analyze the possible strains, we are at once faced by the extreme complexity, not only of the materials which compose it, but of its construction. It consists of a non-rigid shell, of a peculiar shape, composed of loosely-joined plates of pliable bone jointed on to a rigid base and strengthened by the attachment of the dura mater and its system of septa; the contents of this shell are partly solid and partly fluid. Further, these contents do not

lie in an absolutely closed space, for a certain amount of blood and cerebrospinal fluid can be squeezed out of it, whilst the termination of the hind-brain can be crowded down through the foramen magnum.

Even were it possible, it is not my intention to discuss the behaviour of all this complexity under stress. I shall confine myself to three specific points in the structure of the head. These are (1) its plasticity, depending on the degree of ossification of the cranial bones, (2) the attachment of the septa of the dura mater to the cranial bones, and (3) the connection with the septa of certain blood vessels. On these structural features depend the production of the two special strains which form the subject of this paper, viz., stretching and tearing of the tentorium cerebelli and falx cerebri and the rupture of certain cerebral blood vessels. The sequence of events may be summarized as follows:—

The first effect of stress is alteration in the shape of the head, or moulding; this necessarily involves alteration in the position, absolute and relative, and curvature of the cranial bones. This movement of the bones is simultaneously transmitted to, *and is resisted by* (this is important to appreciate) the attached septa of the dura mater, which appear to form a mechanical system especially arranged to limit the movement of the bones forming the cranial vault, and to resist a dangerous degree of alteration in the shape of the head. The resisting septa become tense and stretched, and altered in position and direction. Overstretching results in tearing, the most common site for tears being in the tentorium cerebelli at its junction with the falx cerebri. Finally these changes in the septa are transmitted to the vein of Galen, whose fixed point is at the apex of the tentorium cerebelli; this vein becomes stretched, kinked and engorged, so that either itself or some of its tributaries are ruptured, resulting in subdural cerebral hæmorrhage of greater or lesser extent. (Refer to Fig. 1.)

These deductions are based on evidence gained by the study of (1) the mechanical construction of the fœtal head; especially the system on which the septa of the dura mater are arranged, the disposition of their strengthening bands, their connection with the cranial bones and the way they are influenced by alterations in the shape of the head, and (2) the injuries to the septa and blood vessels found in the case of fœtuses whose heads have been subjected to excessive stress during labour. The remainder of this section consists in the elaboration of these points.

(*b*) *On Alteration in the Shape of the Head, or Moulding.*

I have stated that moulding of the head is essentially an example of a slide or shearing strain, and is brought about princi-

FIG. 1. (Case 78.)

Incomplete tear of Tentorium Cerebelli on right side; the tear is across the fibres at the base of the anterior vertical band. The head shows extreme moulding after labour with generally contracted pelvis. Note elevation of apex of Tentorium and change in direction of vein of Galen and straight sinus.

pally by the action of compressive forces acting at the ends of the long diameter of engagement. (It is not strictly correct, however, to state that the head does not change in size; there is probably a decrease in volume, brought about partly by the squeezing out of some blood and cerebro-spinal fluid and partly by the crowding down into the foramen magnum of the termination of the hind-brain. Evidence of such decrease in volume may be seen in the compensatory overlapping of the bones of the vault. I wish to emphasize that any decrease in the volume of the head by these means can be so slight as to be, for practical purposes, negligible. The alteration in shape is the all-important factor.)

Alteration in shape is brought about partly by a displacement of the bony vault as a whole and partly by bending of the individual bones which compose it. The displacement of the bones as a whole takes place chiefly at the junction of the plate with the base of the occipital bone; this hinge-joint allows a considerable range of movement backwards and forwards. The greatest bending of individual bones occurs in the parietals and frontal; the occipital bone is more rigid and, although it becomes bent to a certain extent, confines itself chiefly to the rôle of moving backwards or forwards on the occipital hinge, carrying with it the rest of the vault. The vault of the skull is plastic as a whole and can, within limits, change shape in most directions, but alterations in the shape of the head are chiefly dependent on the backward or forward movement of the occipital plate at the occipital hinge; bending of the bones is secondary to this and is, of course, a very necessary accompaniment.

According as to whether the forces acting on the head force the occipital bone forwards or backwards, alterations in the shape of the head may be divided into two groups, (1) decrease in antero-posterior measurement, (2) increase in antero-posterior measurement.

Decrease in antero-posterior measurement is brought about by pressure applied at the opposite ends of the diameters lying between the occiput and forehead, *i.e.*, suboccipito-bregmatic, suboccipito-frontal and occipito-frontal; such pressure occurs during labour in vertex presentations and in the after-coming head in breech presentations, and is correspondingly increased when the pelvis is contracted. Decrease in antero-posterior length is naturally accompanied by a compensatory increase in vertical height; in this form of moulding the chief change is a displacement forwards of the plate of the occipital bone, accompanied by arching of the vault of the head along the sagittal suture and free bending of the parietal and frontal bones. This is illustrated in Fig. 2 (II).

Increase in antero-posterior measurement occurs when the head

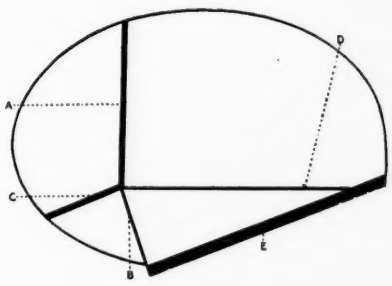
is compressed between the base of the skull and the vault, as in face and brow presentations. The chief change is a displacement backwards of the plate of the occipital bone, the vault of the skull becomes flattened, and the forehead is made protuberant by bending of the frontal and parietal bones. This is illustrated in Fig. 2 (III).

(c) *On the Effect on the Dura Mater Septa of Alterations in Shape of the Fœtal Head.*

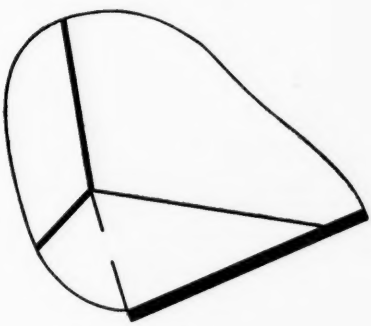
It is probable that, normally, the septa are in a state of rest and are nowhere in a state of positive tension or slackness. When the head undergoes changes in shape alterations in the tension of the septa are inevitable, owing to the nature of their attachments to the cranial bones. The behaviour of the septa is easily demonstrated by the following observations.

Take a fœtal head, reflect the scalp and remove sufficient of one parietal bone to allow the corresponding cerebral hemisphere to be removed and the septa to be viewed from that side. Now compress the head in the occipito-frontal diameter so that the head is shortened antero-posteriorly by the forward displacement of the occipital bone, and heightened vertically by the elevation and bending of the vault (refer to Fig. 1). At the same time observe the septa. The middle two-thirds and the inferior free edge of the falx cerebri, and the tentorium cerebelli, will be seen to become stretched and tense. At the same time the septa move as a whole, as can be appreciated by observing the anterior point of junction between the falx and tentorium; this will be seen to be displaced upwards and slightly forwards, the upward movement being much more pronounced than the forward. If, now, the compression be continued, the tension increases, and finally the tentorium becomes overstretched and tears near its free border just below its junction with the falx (refer to Fig. 2).

The manner in which this sequence of events occurs is this. That part of the cranial vault which becomes elevated and bent gives attachment to, approximately, the middle two-thirds of the falx. This part of the falx is therefore pulled upwards by the vault; but it is attached below to the tentorium cerebelli and is thereby prevented from accompanying the vault upwards. In consequence, the middle two-thirds of the falx becomes tense and stretched. The pull from the falx is transmitted to the tentorium, which in its turn also becomes tense and stretched. This result is radically different from what might on first thoughts be expected to occur; for owing to the approximation of its posterior (occipital bone) to its anterior (crista galli) attachment, the falx might reasonably be conceived to become slack instead of tense. The true



I.



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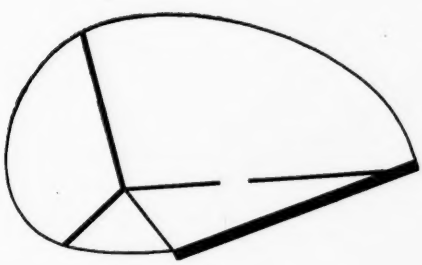

III.

FIG. 2.

Diagrammatic outlines of head and septal system of dura mater. The lines representing the septa show their chief directions of strength. (A) Falx cerebri; (B) middle (vertical) part of Tentorium Cerebelli; (C) line of junction of Tentorium and Falx; (D) anterior (horizontal) part of Tentorium Cerebelli; (E) base of skull. I. Normal shape of head. II. Shape of head during compression in occipito-frontal diameter; greatest strain on vertical part of Tentorium. III. Shape of head during compression between vault and base; greatest strain on horizontal part of Tentorium.

conception of what should occur only becomes clear when it is recollected that the part of the falx attached to the elevated vault is anchored down by the tentorium cerebelli.

Next compress the head between the vault and the base, as occurs in face and brow presentation, so that it becomes lengthened antero-posteriorly by the backward displacement of the occipital bone. The free border of the tentorium and the lower free border of the falx will be seen to become stretched and tense; the remainder of the falx becomes slack, owing to the approximation of its attached and free borders by the lowered elevation of the vault of the cranium.

The septa should be regarded as stays to the cranial bones, like the stays of a mast. Excursion of the bones and bending are resisted by the tension of the septa, just as the swaying of a mast is resisted by the tension of its stays. If excursion and bending of the bones are too great the septa tear, just as the stays of a mast will snap if it is forced to sway too much. Carrying the simile a stage further, the breaking of a mast's stays allows it to oversway and break; the tearing of the septa permits still further displacement and bending of the cranial bones which brings about dangerous disturbances in the relationship of the intracranial contents.

According to this conception the septa exert a protective function in labour; they form a defensive system against excessive alterations in the shape of the fœtal head. Moulding of the head is, up to a point, a very beneficial process, without which many a fœtus could not be born; but excessive moulding is dangerous and may cause fœtal death by producing intracranial disturbances, the most evident of which is, as I shall later show, cerebral hæmorrhage from the overstretching and rupture of certain blood vessels.

Striking confirmation of the theory that the septa are designed to take stress is found in the fact that they contain special strengthening bands and fibres, arranged on admirable mechanical principles along the lines where stress is likely to fall during moulding of the head. I shall now describe these stress bands and stress lines in detail.

II.—On the Anatomy of the Septa, especially as regards the Stress-bands and Stress-lines.

The dura mater consists of two layers, an inner and an outer, which differ widely in structure and function, and, no doubt, in origin. The outer layer is a tough fibrous membrane lining the inner surface of the cranial bones; it is in reality their inner periosteal layer and will subsequently be referred to as the perios-

teal layer. This layer is the important one from the point of view of the present subject; it sends into the cranial cavity the well known septa, and is channelled by the large venous sinuses.

The inner layer forms an inner lining to the periosteal layer and its septa; it is a thin transparent membrane resembling a serous membrane, formed of white fibrous tissue and elastic fibres and lined by a single layer of epithelium. Its function is to serve as a smooth, slippery, membrane for the brain to rest on and to impinge against with the least possible friction.

The Periosteal Layer projects into the cranial cavity four sheets or septa of fibrous tissue, (1) the falx cerebri, (2) the two halves of the tentorium cerebelli, (3) the falx cerebelli. These septa take origin along the course of the great venous sinuses which are themselves channels formed in the substance of the periosteal layer. The line of origin of the falx cerebri follows the course of the superior longitudinal sinus, that of the tentorium cerebelli the lateral sinus and that of the falx cerebelli the occipital sinus. The septa meet opposite the position of the greatest sinus of all—the torcular Herophili. Two points are here of importance; the membrane is especially strong where it forms the walls of the sinuses, and opposite the sinuses the membrane is firmly adherent to the bone, whereas elsewhere it is readily separable. Where the falx cerebri and tentorium cerebelli meet they blend together and form a strong band or line. This line may, for descriptive purposes, be termed the *white line*. The *white line* is situated beneath the straight sinus and occupies the angle where the two halves of the tentorium meet. Its position may be gathered by referring to Fig. 4, where the black dotted line indicates the floor of the straight sinus, which runs backwards in a channel formed in the falx cerebri. The white line pursues a straight course for the anterior two-thirds of its length, making an angle of about 45° with the horizontal; for the remainder of its course it runs more horizontally, following closely the floor of the straight sinus, and ends in a thick band or mass of fibrous tissue attached to the occipital bone in the region of the torcular Herophili.

These septa of the periosteal layer are not of equal strength and thickness throughout, but, at certain definite places, there is an aggregation of fibres into strengthening bands. *These bands are, I believe, developed to enable the cranium and its contents to withstand the effects of excessive stress during labour.* They are certainly disposed on admirable mechanical principles in the particular parts of the septa which are most likely to have to bear the most strain. The tentorium and falx no doubt serve other functions than that of protecting the fœtal cranium and its contents from the effects of excessive stress, but I am convinced that this

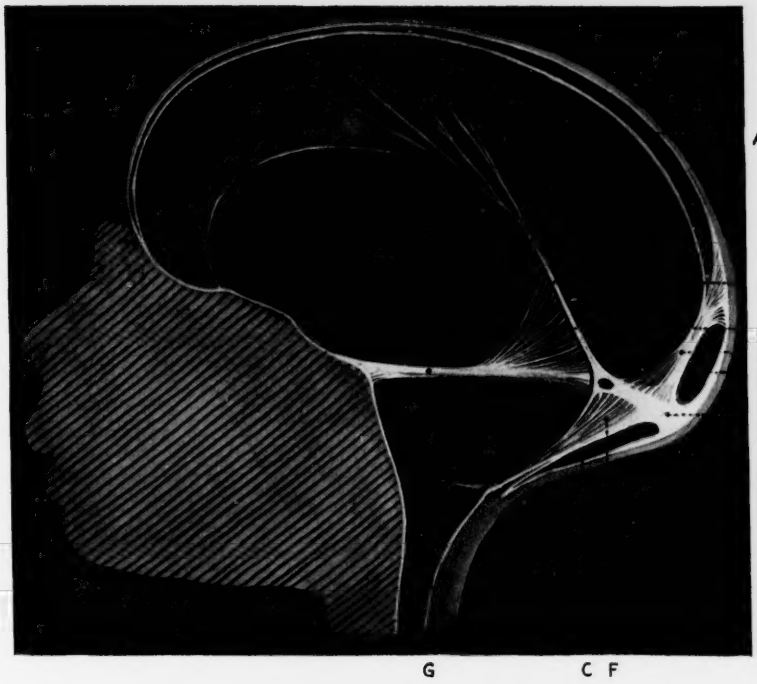

FIG. 3. Semi-diagrammatic drawing to show arrangement of strengthening bands of antero-posterior system. The head has been bisected sagittally immediately to the left of the Falx Cerebri. (A) points to superior longitudinal sinus; (B) to Torcular Herophili; (C) to occipital sinus; (D) to main mass of fibrous tissue; (E) to band descending from posterior end of superior longitudinal sinus; (F) to Falx Cerebelli; (G) to deep horizontal band; (H) to white line; (K) to triangular area in anterior part of Tentorium.

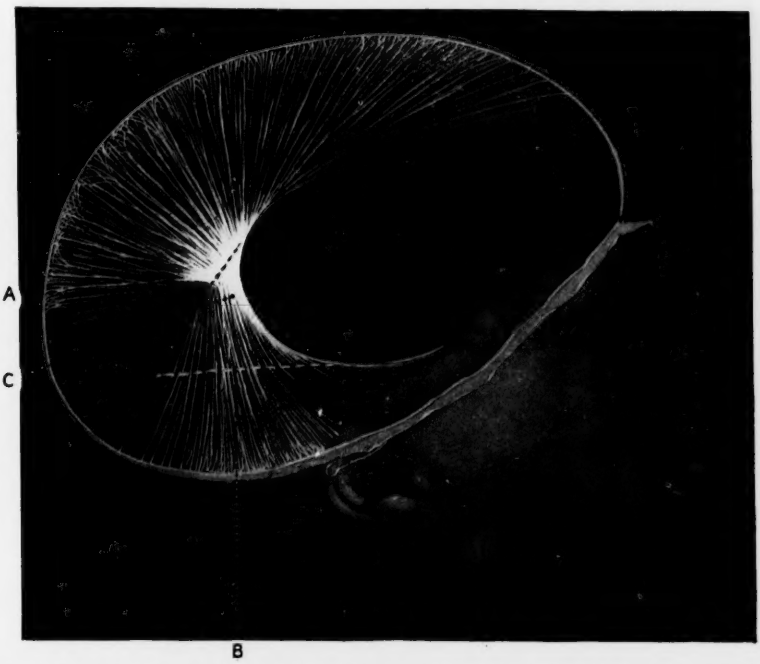

FIG. 4. Semi-diagrammatic drawing to show arrangement of fibres in Falx and in superficial layer of Tentorium, after removal of parietal and part of occipital and frontal bones. (A) points to black dotted line indicating floor of straight sinus; (B) points to white dotted line indicating position of deep horizontal band; (C) points to anterior vertical band.

protective function is of the highest importance. Precisely how these bands are strained during the stress of labour and how they exert their protective functions I shall discuss later on, after I have finished the anatomical description.

According to the main directions in which they run, these strengthening bands may be roughly, but I believe usefully, divided into two main systems:

1. The antero-posterior system.
2. The vertical system.

To illustrate their arrangement I have had two semi-diagrammatic drawings made. Fig. 3 is a fœtal head, bisected in the sagittal plane, the line of section passing immediately to the left of the falx cerebri; it illustrates the arrangement of the antero-posterior system. Fig. 4 is from a fœtal head, after removal of the parietal and part of the frontal and occipital bones, so as to expose the tentorium and falx in their entirety. In both these drawings the chief aggregation of fibrous tissue, in strengthening bands, appears white.

(1) *The Antero-posterior System.* In the region of the torcular Herophili is a mass of fibrous tissue, firmly attached to the occipital bone: it is broken up, and its arrangement complicated by being channelled by the torcular and the terminations of the superior longitudinal, straight and occipital sinuses. It seems to have three components, (1) the central and densest part is a wedge-shaped mass, firmly adherent to the occipital bone opposite the occipital protuberance, and lying below and to one side (generally to the left) of the torcular, (2) the upper part is a strong band which at first lies free, like a pillar, in the lumen of the superior longitudinal sinus: it passes downwards and forwards, in front of the torcular, to join the central mass; (3) its lower part is a broader but thinner collection of fibres disposed around the occipital sinus, forming the falx cerebelli. This main mass of fibrous tissue forms the meeting point of all four septa of the dura mater: it is the sheet-anchor of the whole complicated system.

The chief continuations forwards of the main mass consist of two extremely important bands of considerable strength. These two bands are symmetrically placed on either side and originate fanwise from the sides of the main mass; their fibres converge as they pass forwards to be inserted into the anterior clinoid processes; they run along the lower surface of each half of the tentorium and form the straight part of its free edge. They may be termed the *deep horizontal bands of the tentorium*, and play an important part in resisting excessive cranial stress. They are depicted in Figs. 3 and 5.

(2) *The Vertical System.* This system illustrates admirably

the mechanical principle of stress-lines, and is represented in Fig. 4. It consists of two opposing sets of convergent fibres which meet in their points of convergence. From above downwards converge fibres from the falx cerebri; from below upwards converge fibres from the tentorium. From the falx the fibres originate from its middle two-thirds; from the tentorium the fibres originate chiefly from that part which covers the lateral sinus. The converging fibres meet in a strong broad band whose centre, roughly, is placed along the anterior fifth of the white line. This band may be called the *vertical band of the tentorium*. The main part of the band belongs to the tentorium and forms the curved part of its free edge; as it curves downwards and forwards it blends with the horizontal band of the tentorium. This band is subjected to strain in almost every labour; it is stretched when the head is elongated vertically.

I wish to direct particular attention to the triangular part of the tentorium which is bounded above by the white line, below by the line of the horizontal band of the tentorium and in front by the curved free edge of the tentorium. It includes the anterior vertical band of the tentorium. It is the part of the tentorium most commonly subjected to strain and most commonly torn.

The tentorium cerebelli, from the above description, is seen to be strengthened by two main sets of fibres, (*a*) a superficial set which sweeps upwards and inwards to be inserted into the white line and the anterior vertical band, and (*b*) a deep set which consists of the horizontal band. It frequently happens that when the tentorium is overstretched the tear consists in the upward separation of the anterior vertical from the horizontal band, instead of a simple tearing through of the anterior vertical band. This is illustrated in Figs. 10 and 11.

III. On the Morbid Anatomy of Tears of the Septa as found in 81 Fœtuses.

Passing now from theory to facts, do the facts, as ascertained by the circumstances in which the tears arise and the positions they occupy, in the septa of dead fœtuses, support the theory? I think they undoubtedly do. I have pointed out that as the head changes in shape, as in moulding, tension is thrown on the septa; that such tension occurs along definite lines of stress, strengthened by additional fibres and bands; that when the alteration in shape and consequent tension become excessive, the septa become overstretched and tear; and that the tears will naturally occur in that part of the septal system which is included within the area of stress and along the line of greatest stress.

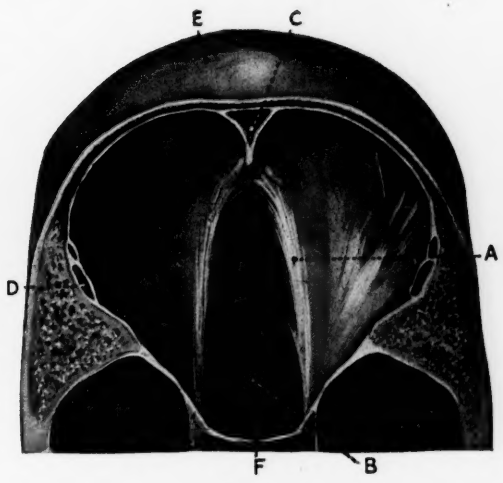

FIG. 5.

Drawing of under surface of Tentorium Cerebelli to show the origin and course of the deep horizontal bands. The head has been sawn through horizontally just below the level of the Tentorium. (A) points to deep horizontal band of right side; (B) to posterior end of free edge of Falx Cerebri; (C) to Torcular Herophili; (D) to left lateral sinus; (E) to occipital bone; (F) to body of sphenoid.

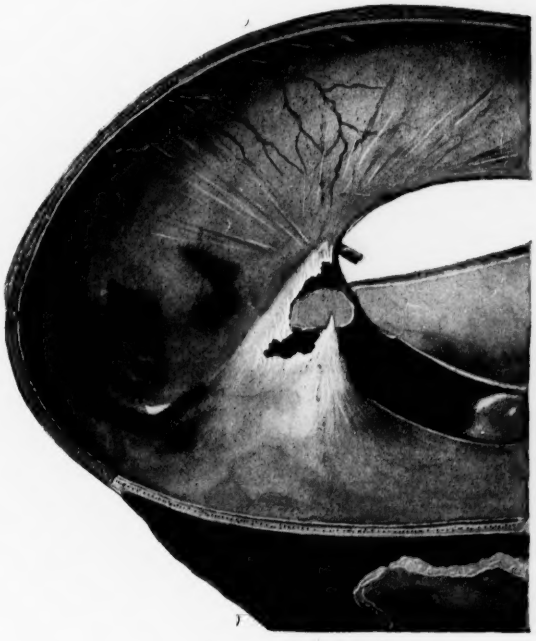

FIG. 6. (Case 51.)

Complete bilateral tear of the Tentorium Cerebelli. On the right side the anterior vertical band has been torn through; on the left side the anterior border of the band has remained intact.

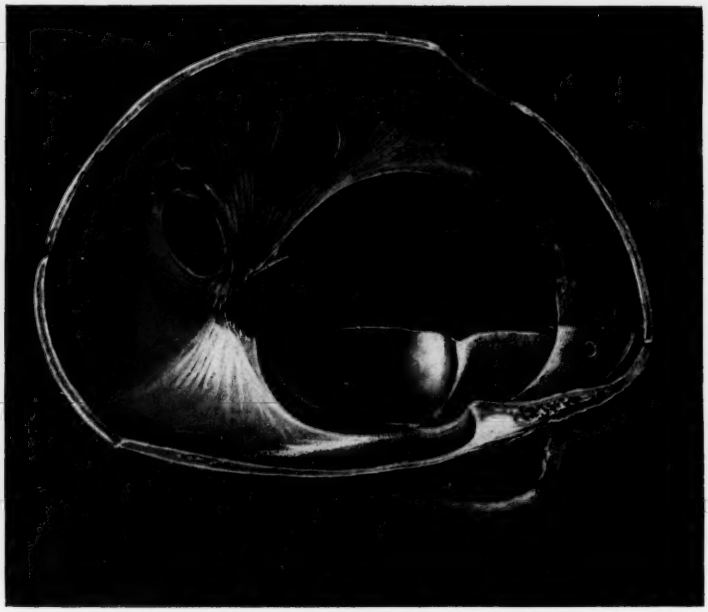

FIG. 7. (Case 7.)

Complete tear of Tentorium Cerebelli, elliptical tears of Falx Cerebri. The tear is in the right side of the Tentorium. The anterior one-third of the line of junction between the Tentorium and Falx has been torn through. The straight sinus (indicated by bristle) has been opened.

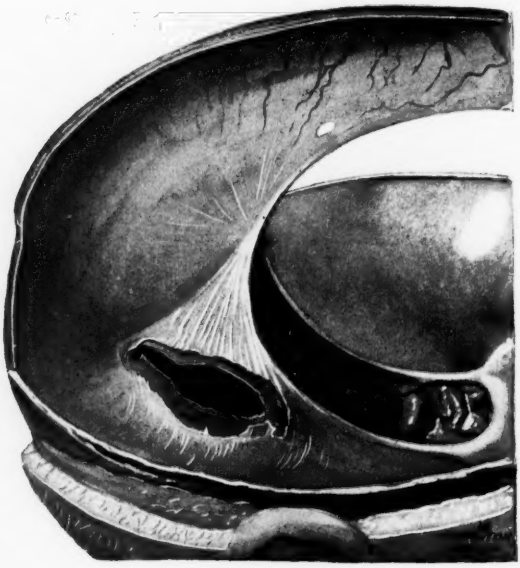

FIG. 8. (Case 52.)

Complete tear of Tentorium Cerebelli on right side. The tear is a large perforation, and involves all the superficial strengthening fibres of the Tentorium and the base of the deep horizontal band.

When the tentorium cerebelli tears, the tear, as would be expected, nearly always is found in the triangular area I have described as situated beneath the line of junction of the tentorium and falx, and bounded in front by the anterior vertical band.

The tears may affect one or both sides of the tentorium, and may be complete or incomplete. Complete tears involve both the superficial and the deep layers of the tentorium; incomplete tears involve only the superficial layer, either the vertical band or the fibres posterior to it. Complete tears usually involve the free border of the tentorium; sometimes the free border is left intact, by reason of the extra strength it gains from the anterior vertical band, and the tear is in the nature of a perforation. In the latter case, the vertical band is always found hanging slack, which shows that it has been stretched beyond the limits of elasticity, and often contains a small hæmatoma. A not uncommon variety of tear is when the superficial layer, including the vertical band, is separated from the deep layer, including the horizontal band; this form of tear necessarily involves a certain amount of tearing through the free border of the tentorium. Very commonly a hæmatoma is found in that region of the tentorium which usually tears; this, I believe, is a sign of excessive stretching without tearing.

All these varieties of tears are shown in the illustrations. Fig. 6 (Case 51) shows bilateral complete tears, that on the left side being a perforation. Fig. 7 (Case 7) shows a complete tear on the right side involving the straight sinus. Fig. 8 (Case 52) shows a large perforating tear in the right side. Fig. 9 (Case 28) shows extensive bilateral tears, with rupture of the wall of the posterior end of the left lateral sinus. Figs. 10 and 11 (Case 34) shows the inner and outer aspects of a tear involving separation of the anterior vertical from the deep horizontal bands (the vein of Galen was torn in this case). Fig. 1 (Case 78) shows an incomplete tear through the base of the anterior vertical band, and Fig. 12 (Case 21) shows an incomplete tear of the superficial fibres below the anterior vertical band.

A summary of the tears is as follows:—

I.—Bilateral, 64	(*a*) both complete	35
	(*b*) both incomplete	15
	(*c*) one complete and one incomplete ...	14
II.—Unilateral, 17	(*a*) complete	8
	(*b*) incomplete	9

Tearing of the falx cerebri was found, always in association with tearing of the tentorium, in only five cases (Nos. 7, 21, 27, 43 and 59). The tears, one or more in number, lay in the middle two-thirds of the falx, and were elliptical in shape, with the long axis of the ellipse lying, as would be expected, in the line of stress.

IV.—On the Mode of Origin and Source of Subdural Cerebral Hæmorrhage.

Subdural cerebral hæmorrhage, varying in amount from a few drops to a copious hæmorrhage, was found in all but six cases (Nos. 21, 33, 41, 48, 50, and 73). The hæmorrhage may be classed as severe, moderate or slight. Severe hæmorrhage accompanies a higher proportion of bilateral complete than of other varieties of tear, but there is no constant relation between the extent of the tear and the amount of hæmorrhage, as the following table shows:

	Severe	Moderate	Slight	Absent
Bilateral, both complete, 35 cases	21	11	1	2
Bilateral, mixed, 14 cases... ...	7	5	1	1
Bilateral, both incomplete, 15 cases	4	7	2	2
Unilateral, complete, 8 cases ...	2	4	2	0
Unilateral, incomplete, 9 cases ...	2	3	3	1

The hæmorrhage does not originate from the tear itself; the fact that in six cases there was no hæmorrhage whatever, and that, in a few other cases, the tear itself, occupied by a tiny clot, lay entirely outside the boundaries of a fair-sized subdural hæmorrhage, is good proof of this. The tentorium cerebelli contains only a few capillary vessels (excepting, of course, the lateral sinus).

It was seldom possible, except in the few cases where a large sinus or blood vessel had ruptured, to find the exact source of the hæmorrhage; the lesser cerebral vessels are so small and delicate, and the fine arachnoid connective tissue surrounding them becomes so infiltrated with blood, that it is impossible to isolate them with accuracy from the surrounding hæmorrhage. In Case 28 the lateral sinus, in Case 7 the straight sinus, and in Case 34 the vein of Galen were found ruptured; in these cases the hæmorrhage was enormous, and its source obvious. Failing the detection of the ruptured vessel, a valuable clue to the origin of the hæmorrhage is its exact situation in the subdural space and its relation to the surrounding structures, especially blood vessels. In order to determine this more accurately I made small openings in some of the heads in which I expected to find hæmorrhage and soaked them in formalin solution for a month before dissection. A large hæmorrhage is not helpful for this purpose as its spread is too diffuse, but a small hæmorrhage is necessarily confined to a small area of the subdural space. It soon became apparent that the origin of the hæmorrhage could be pinned down within narrow limits; for it was found that, in cases of cerebral hæmorrhage, a certain situation in the subdural space was never free from blood, and that, in the case of small hæmorrhages, the blood was always confined to this one situation and was in relation to the same blood

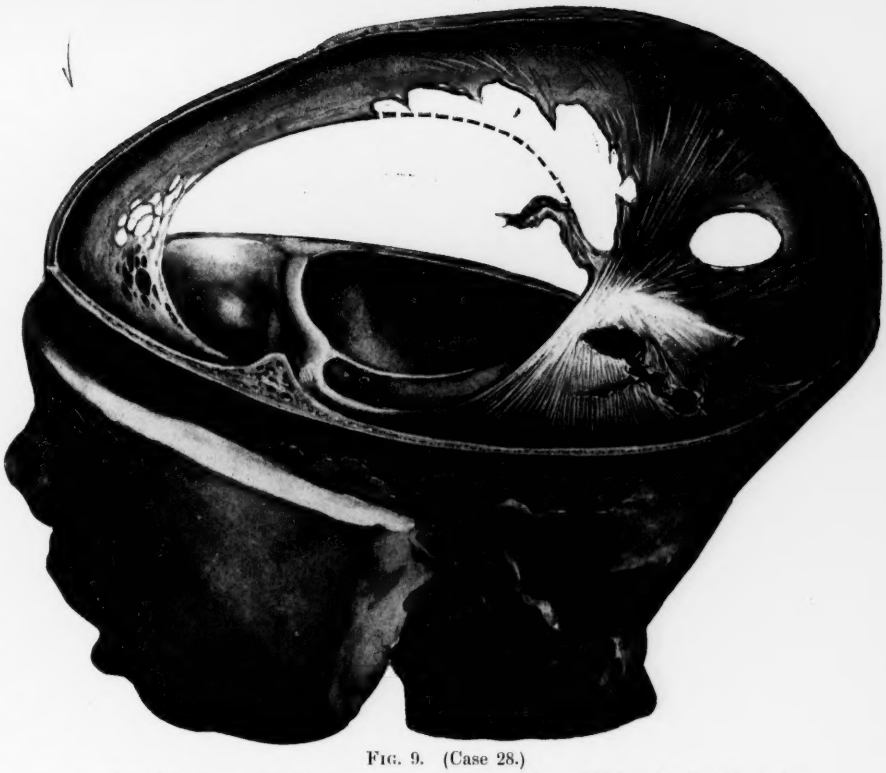

FIG. 9. (Case 28.)

Complete tears of Tentorium and extensive tearing of Falx. In the Tentorium there are two perforating tears on the left side; one is a ragged tear starting below the base of the anterior vertical band and extending outwards almost to the lateral border of the Tentorium. The other is a large perforation through the superior wall of the left lateral sinus at its termination in the Torcular Herophili.

FIG. 10. (Case 34.) Complete tear of Tentorium Cerebelli with separation between superficial and deep layers. The anterior vertical band is widely separated from the deep horizontal band.

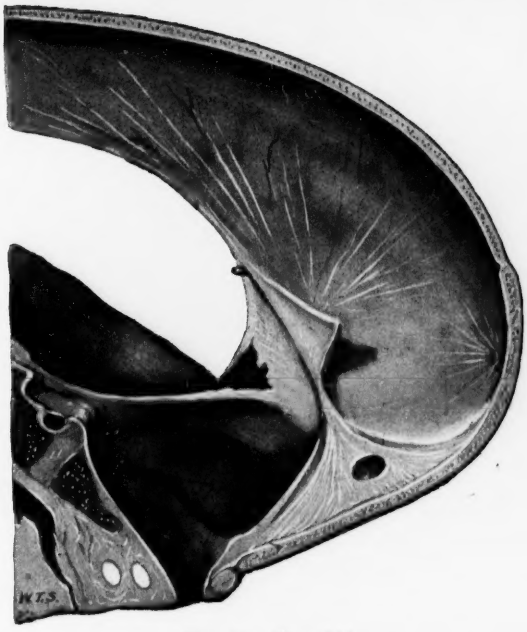

FIG. 11. (Case 34.)
Same specimen as in Fig. 10. Seen from within after sagittal bisection of head just to left of Falx.

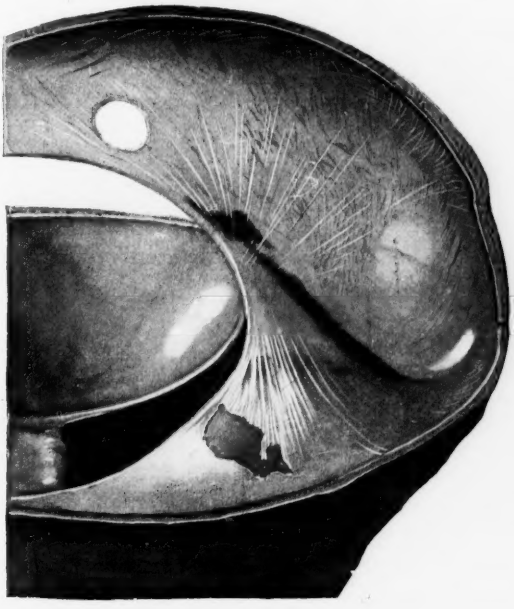

FIG. 12. (Case 21.)
Incomplete tear of Tentorium Cerebelli, left side. The superficial fibres have been torn through just below base of anterior vertical band. There is also a small elliptical tear in the Falx.

vessels. This situation is a narrow area bounded in front by the transverse fissure, behind by the upper part of the tentorium, below by the pons Varolii, and laterally by the mesial aspects of the anterior lobes of the cerebellum; its centre corresponds to the course of the vein of Galen. The blood vessels which occupy this area are the vein of Galen and its tributaries. As these vessels are precisely the ones that are likely to be stretched and torn, and as in two cases I found the vein of Galen itself ruptured, it is reasonable to draw the general conclusion that these vessels are the origin of the hæmorrhage in cases of excessive cranial stress.

The mechanism which leads to stretching and tearing of these veins must now be considered. Any movement of the apex of the tentorium is necessarily transmitted to the vein of Galen, whose fixed point is at its entrance into the straight sinus. In the common forms of cranial stress, *i.e.*, anteroposterior longitudinal stress, it has already been pointed out that the apex of the tentorium is drawn upwards, and that this upward displacement is very considerable in cases of excessive stress. The vein of Galen follows this movement with two results, (1) its line of direction is altered, and (2) it becomes stretched and tense. The altered course of the vein is admirably shown in Fig. 1; instead of passing backwards and slightly upwards, the vein is seen to be running almost directly upwards and making an acute angle with the straight sinus. In consequence, the vein becomes kinked at its entrance into the sinus, with the result that the flow of blood is impeded or obstructed. The enormous distension and engorgement of the vein of Galen and its tributaries is always a striking appearance in cases of torn tentorium and, together with the anatomical findings, is sufficient evidence of the occurrence of the series of events I have described. If, now, the distended veins are still further stretched, they rupture; it is sufficiently obvious that a vein, whose walls are already in a state of high tension from engorgement, will more easily rupture, as the result of further longitudinal stretching, than a vein whose walls are in a normal state of tension.

It now remains to consider which particular veins are ruptured. The vein of Galen itself is seldom ruptured: the rupture of such a prominent vessel could seldom escape careful observation, and I was only able to detect it twice. In these cases the vein had yielded at its fixed point, *i.e.*, at its point of entrance into the straight sinus. The tributaries which the vein of Galen receives, from the point of its formation by the junction of the two internal cerebral veins to its termination in the straight sinus are (*a*) the two basal veins, (*b*) veins from the superior surface of the cerebellum, which run forwards and upwards to join the vein of Galen, (*c*) veins from the mid-brain, and (*d*) veins from the Pons. Another

set of veins, although they do not enter the vein of Galen, must also be considered: these are veins passing from the superior surface of the cerebellum directly into the straight sinus. With the exception of the basal veins, the above veins are too small and delicate to be satisfactorily traced in the fœtus, unless they are distended with blood. I believe, so far as my observations go, that the usual source of hæmorrhage in these cases is from the tributaries which the vein of Galen receives from the cerebellum and mid-brain, and from the cerebellar veins which enter the straight sinus.

The mechanism of stretching and rupture of these veins is as follows. They are stretched between their two fixed points; their upper fixed point is the vein of Galen, and their lower is the cerebellum. The vein of Galen, as already described, is displaced upwards and forwards, and is kinked, by the pull of the tentorium; the cerebullum is not only held down, but is pressed still further down into the posterior fossa, by the downward pressure of the posterior poles of the cerebral hemispheres. In consequence of the upward pull and kinking of the vein of Galen, and the fixation or downward pull of the cerebellum, these delicate veins become stretched and engorged, and finally ruptured. The same mechanism of rupture applies to the cerebellar veins which enter the straight sinus direct.

V.—**Clinical Part: Analysis of the 81 Cases.**

In macerated fœtuses the dura mater is so softened and weakened and the loosened cranial bones allow of such extreme alteration in the shape of the head, that tears of the tentorium and falx are seldom absent, and arise on very slight provocation.

Out of the 167 fresh fœtuses, the tentorium cerebelli was torn in no less than 81, or 48 per cent. This demonstrates how extremely common the injury is. Tearing of the falx cerebri is comparatively rare, and was found, always in association with tearing of the tentorium, in only five cases (Nos. 7, 21, 27, 43, 50). Subdural cerebral hæmorrhage, varying in amount from a few drops to a copious hæmorrhage, was associated with the tears in all but six cases (Nos. 21, 33, 41, 48, 50 and 73).

For purposes of clinical analysis the 81 cases found in the 167 fresh fœtuses may be divided into two main groups:

I. Those in which the fœtus was delivered by the head, 46 cases.

II. Those in which the fœtus was delivered by the breech, 35 cases.

I. The 46 head-first deliveries comprised 44 cases of vertex presentation; one case of face presentation in which labour ended naturally (No. 28), and one case of brow presentation, in which labour was ended by forceps (No. 75).

Analysing further the 44 cases of vertex presentation it will be seen that 25 were cases of forceps delivery and that the other 19 were cases of natural delivery.

(1) *Forceps cases.* The indications for the use of forceps were as follows:—

(*a*) Contracted pelvis, seven cases. The low operation was used in four cases (No. 18 after pubiotomy), and the high in three (No. 30 was followed by Cæsarean section).

(*b*) Placenta prævia, four cases. The low operation was used three times and the high once.

(*c*) Prolapsed cord, four cases. The low operation was used three times and the high once.

(*d*) Prolonged second stage of labour. In six the delay was due to persistent occipito-posterior presentation; in one of these the fœtus was extremely large (No. 80). In four it was said to be due to uterine inertia.

In considering these forceps cases it is apparent that in some the cranial stress was unavoidably great; such are all the cases of high forceps operation (always accompanied by a high fœtal death-rate), of pelvic contraction, of prolapsed cord, and those cases of placenta prævia in which the fœtus was delivered rapidly. In such cases tearing of the tentorium is readily accounted for.

On the other hand, in cases where forceps is applied merely for a prolonged second stage due to malposition of the head or inertia of the uterus, the occurrence of the tearing of the tentorium invites criticism. The production of sufficient cranial stress to make the tentorium cerebelli tear means either that the force exerted by the forceps was excessive or was applied to the wrong diameter of the head, or both; neither should occur if the os is fully dilated or if the occiput is directed forwards. If forceps is responsible for the saving of many fœtuses, it is also responsible for the unnecessary death or injury of others; it is used too often and on the flimsiest indications.

As regards the direction of the applied force, the most dangerous direction is when the forceps is applied to the antero-posterior diameter of the head, or to one approximating it. Even a moderate amount of force applied in this direction can, by causing vertical elongation of the head, lead to stretching and tearing of the tento-

rium. The risk of applying forceps to the extremely plastic head of a premature fœtus is well known.

(2) *Natural delivery in vertex presentation.* In some of these cases the conditions were favourable for the occurrence of excessive cranial stress; in others it is puzzling to find the reason. The 19 cases may be analysed as follows:—

Normal vertex presentations, 3 cases (Nos. 64, 71, 79).
Twins (one fœtus lived in each case), 3 cases (Nos. 13, 23, 53).
Placenta prævia, 3 cases (Nos. 50, 57, 61).
Accidental hæmorrhage, 4 cases (Nos. 22, 39, 48, 68).
Long second stage (occ. ant.), 1 case (No. 45).
Rapid labour following induction for albuminuria of pregnancy, 1 case (No. 70).
Precipitate labour, 1 case (No. 65).
After former colpoperineorrhaphy, 1 case (No. 19).
General œdema of fœtus, 1 case (No. 27).
Persistent occipito-posterior, 1 case (No. 74).

Two were cases of normal full-time labour (Nos. 71 and 79), *i.e.*, the second stage was not too rapid or too long, the resistances were not unduly great, the occiput was forwards and the fœtus was neither premature nor of great size. In others, prematurity of the fœtus, with the consequent greater plasticity of the cranium, is the only predisposing factor to be found; such are one of the cases of normal labour (No. 64), the cases of twins—in No. 13 the head was born with the occiput behind—two of the cases of placenta prævia (Nos. 50 and 61), and three of the cases of accidental hæmorrhage (Nos. 39, 48 and 68). A very rapid second stage, unless the resistances be slight, and especially if the fœtus be premature, is an easily appreciated factor; such are cases 19, 65 and 70. It is to be noted that pituitrin was given to one of the cases of placenta prævia (No. 50, fœtus premature), and to one of accidental hæmorrhages (No. 22); the action of this powerful ecbolic as a possible factor in producing excessive cranial stress should not be overlooked. Case 19 is an admirable example of a combination of many factors; the mother had an extensive colpoperineorrhaphy done a year previously for prolapse of the uterus, the premature fœtus (syphilitic) was expelled with great rapidity, causing severe laceration of the thick, resistant perineum.

It is not at all easy to give a reasonable explanation for the torn tentorium in many of these cases of natural vertex delivery. I strongly suspect that over-zealous "guarding" of the perineum from rupture, especially by strong forward pressure against the perineum forcing the occiput against the symphysis, may explain some.

II.—*Breech deliveries.* Tears of the tentorium cerebelli are found with great frequency in dead fœtuses delivered by the breech. There are 47 cases of breech delivery amongst the 167 fresh fœtuses and I have found tearing of the tentorium in 35, or, approximately, 75 per cent.

The explanation is simple, and I have already referred to it. During its final passage the after-coming head is rapidly, though comparatively momentarily, compressed in a series of diameters lying between the forehead and the occiput; compression in this direction causes vertical elongation of the head (see Fig. 20), and I have already pointed out that it is this particular alteration in shape which throws the greatest strain on the tentorium cerebelli.

Analysis of cases. Cases of breech labour present a wide divergence in type. In order to appreciate the significance of tears of the tentorium in breech delivery it is necessary to classify the cases. Where the after-coming head is dragged through a contracted pelvis, or where the fœtus has had to be delivered rapidly for such complications as antepartum hæmorrhage, the discovery of the effects of excessive cranial stress might reasonably be anticipated. But tearing of the tentorium is by no means confined to cases of this type. It is a significant fact, and one of great practical importance, that many are cases of what may be called ordinary, normal breech labour.

Breech labour may be divided into three classes:—

(1) Primary uncomplicated breech presentation, in which there are no complications of pregnancy, and no complications of labour (except premature labour) other than those arising direct from the presentation, such as extended legs or arms, prolapse of the cord.

(2) Primary complicated breech presentation, such as breech presentation in cases of antepartum hæmorrhage, contracted pelvis, etc.

(3) Breech by version.

The 47 cases of breech delivery, and the 35 with tearing of the tentorium cerebelli, are distributed amongst these classes as follows:—

(1) Primary uncomplicated breech. Total number of cases, 17; tearing of the tentorium found in 15.

(2) Primary complicated breech, total number of cases, 2: tearing of the tentorium found in neither.

(3) Breech by version, total number of cases, 28; tearing of the tentorium found in 20. In these 20, the version was performed for the following complications:—

Placenta prævia	10 cases.
Transverse presentation	5 cases.
(Including a case of spontaneous evolution.)	
Contracted pelvis	3 cases.
Brow presentation	2 cases.

A broad survey of these figures reveals facts which, to myself at all events, are novel and significant. (1) Tearing of the tentorium is found in 75 per cent. of dead fœtuses delivered by the breech when all classes of breech delivery are included. (2) Tearing of the tentorium is found in 88 per cent. of dead fœtuses in cases of primary uncomplicated breech presentation, *i.e., as the result of normal breech labour.* In none of these cases was there any reason for undue resistance to the passage of the head, from contraction of the maternal passages or from excessive size or malposition of the fœtal head. Nor was there any apparent reason for rapid delivery of the fœtus. It must be admitted that tearing was favoured by prematurity of the fœtus (for this purpose I include fœtuses below 48 cmm. long) in five cases (Nos. 2, 15, 24, 29 and 46). (3) Tearing of the tentorium is found in 71 per cent. of dead fœtuses delivered after podalic version. This is not so surprising; rapid delivery was no doubt practised in some of the cases of placenta prævia and in those of the transverse presentation complicated by prolapse of the cord, and in the cases of contracted pelvis there was great resistance to the passage of the head. But the significance of these findings is this: it is more than likely that some of these fœtuses escaped death from the primary complication only to meet it as the result of breech delivery. In any case it is a pity to kill a fœtus twice. It is true that in many of these cases the version was performed for the sake of the mother, whose interests must always be paramount; but if a breech delivery be properly managed there should never be sufficient cranial stress to lead to tearing of the tentorium—excluding, of course, cases where rapid delivery is indicated.

On the Actual Causation of Fœtal Death in Cases of Excessive Cranial Stress.

In this condition, as indeed in most others, it is impossible to assign the exact cause of death. Quite apart from the two great visible effects of tearing and hæmorrhage, we have to consider

the general rise of intracranial pressure, the evidence of which is not seen post mortem. What part this plays in causing death must be left to the imagination; perhaps the crowding down of the medulla oblongata into the foramen magnum results in dangerous pressure on the so-called vital centres. In cases where there is a large, or moderate, hæmorrhage, it is fair to assume that the fœtus has been killed by the hæmorrhage. But even this does not always kill the fœtus, for I have performed post mortems on several infants, who have survived birth by as much as two days, who displayed extensive bilateral tears of the tentorium and large hæmorrhages; such infants had, of course, been in a precarious condition since birth. The position of the hæmorrhage is probably of importance; a small hæmorrhage confined beneath the tentorium would be more dangerous than a larger and more diffuse one above this region. The actual tears, unaccompanied by hæmorrhage, cannot be regarded as fatal injuries; the septa of the dura mater are not vital structures, nor are they the source of hæmorrhage. Furthermore, evidence of tearing of the tentorium may be found in infants who have survived birth for a long time. Having survived the original stress, there is no reason why a child should be much the worse for a torn tentorium, provided there has been no, or only very slight, hæmorrhage. It cannot yet be stated what precisely are the effects in after life of these injuries; there is no collected evidence. I feel sure that if pathologists who are in the habit of performing post mortems on children were to look for evidence of these tears, they would find it surprisingly often. I have personally found one such example in a child of six months old, in whom there was a large complete tear, with healed edges, in the left side of the tentorium. There is, unfortunately, no clinical record of this case, as the child died shortly after admission into hospital, before notes could be taken. A point of great interest was the oblique shape of the head which had persisted since birth; the permanent alteration in the shape of the head, in combination with a torn tentorium, is of great importance in throwing light on the ætiology of the rare infantile condition known as "oblique head." It also tends to support my theory that the septa of the dura mater act as supports or stays to the bones.

It will be noted, on referring to the Table, that many of the fœtuses were born with the heart beating; they were cases of "white asphyxia" which could not be "resuscitated" and, literally, cases of "fœtal death," since pulmonary respiration, which marks the metamorphosis between the fœtal and infant states of existence, was never established.

List of Cases of Torn

No.	*Para.*	*Length.*	*Presentation.*	*Complications and Operations.*
1	I	53	vertex, O.A.	contracted pelvis, forceps
2	II	43	primary breech	delivery not difficult
3	VII	56	vertex, L.O.P.	forceps, difficult delivery
4	I	45	vertex, R.O.P.	manual rotation, forceps
5	IV	50	primary breech	delivery not difficult
6	VII	52	breech by version	placenta prævia, bag, followed by version
7	VII	52	primary breech	delivery not difficult
8	I	40	vertex	placenta prævia, high forceps
9	I	52	vertex, L.O.P.	prolapse of cord, forceps
10	VIII	52	breech by version	premature rupture of membranes, bag, prolaps of arm, version
11	I	52	vertex, O.A.	contracted pelvis, forceps
12	I	39	breech by version	placenta prævia, version
13	III	48	vertex, L.O.P.	natural delivery, second of twins
14	X	47	vertex, O.A.	prolapse of cord, high forceps
15	VI	42	primary breech	arms extended
16	VIII	48	breech by version	placenta prævia, version
17	II	51	vertex, O.A.	prolapse of cord, forceps
18	II	53	vertex, O.A.	contratced pelvis, pubiotomy, forceps
19	V	46	vertex, O.A.	rapid 2nd stage, severe perineal tear, former extensive colpoperineorrhaphy
20	I	48	primary breech	difficult delivery of head
21	II	53	vertex, O.A.	contracted pelvis, forceps
22	V	51	vertex, O.A.	accidental hæmorrhage, pituitrin
23	V	48	vertex, O.A.	natural delivery, second of twins
24	I	40	primary breech	delivery not difficult
25	IX	47	primary breech	delivery not difficult
26	I	49	breech by version	transverse presentation, version
27	XI	47	vertex, O.A.	natural delivery
28	VI	51	brow	conversion into face, forceps
29	XII	36	primary breech	arms extended, difficult delivery
30	I	52	vertex, O.A.	contracted pelvis, forceps followed by Cæsarean section
31	V	53	vertex	placenta prævia, prolapse of cord, forceps
32	VIII	49	breech by version	contracted pelvis, induction, version
33	VI	49	breech by version	placenta prævia, version
34	VI	47	vertex	placenta prævia, bag, forceps
35	I	48	breech by version	transverse presentation, version
36	II	52	vertex	placenta prævia, bag, forceps
37	I	54	primary breech	prolapse of cord, leg-traction
38	VI	55	primary breech	difficult delivery of head
39	IV	47	vertex	accidental hæmorrhage, natural delivery

Tentorium Cerebelli.

Nature of Tear in Tentorium.	*Hæmorrhage.*	*Birth. Condition of Fœtus at*
R complete, L incomplete	extensive, in all fossæ	heart beating after birth
R incomplete, L complete	extensive in middle & post. fossæ	no note
R complete, L complete	extensive	no note
R complete, L incomplete	moderate	dead at birth
R incomplete, L complete	extensive in middle & post. fossæ	no note
R none, L complete	moderate	dead at birth
R complete, L complete, falx torn, straight sinus opened	extensive, in all fossæ	general œdema of fœtus
R complete, L complete	moderate	heart beating after birth
R complete, L complete, depressed fracture of L parietal bone	extensive, in all fossæ	heart beating after birth
R incomplete, L complete	extensive, in all fossæ	dead at birth
R complete, L complete	extensive, in all fossæ	heart beating after birth
R complete, L incomplete	slight	dead at birth
R complete, L complete	moderate, middle & post. fossæ	heart beating after birth
R complete, L complete	extensive, in all fossæ	heart beating after birth
R complete, L complete	extensive in middle & post. fossæ	not noted
R incomplete, L complete	extensive	dead at birth
R incomplete, L incomplete	slight	dead at birth
R complete, L incomplete	extensive in middle & post. fossæ	no note
R none, L incomplete	extensive, in all fossæ	fœtal syphilis
R none, L complete	slight	heart beating after birth
R complete, L incomplete, falx torn	none	dead at birth
R incomplete, L incomplete	moderate	dead at birth
R incomplete, L none	slight	dead at birth
R none, L incomplete	moderate	dead at birth
R incomplete, L incomplete	moderate in middle & post. fossæ	heart beating after birth
R none, L complete	extensive	dead at birth
R complete, L complete	extensive, chiefly in middle fossæ	general œdema of fœtus
R complete, L complete, falx torn extensively, L lateral sinus opened	very extensive	dead at birth
R incomplete, L incomplete	extensive in middle & post. fossæ	dead at birth, liver ruptured
R complete, L none	moderate, in post. fossæ	heart beating after birth
R incomplete, L incomplete	extensive	dead at birth
R complete, L incomplete	extensive in middle & post. fossæ	dead at birth
R complete, L incomplete	none	no note
R complete, L complete	extensive, vein of Galen torn	dead at birth
R incomplete, L incomplete	moderate	no note
R complete, L incomplete	extensive, in all fossæ	dead at birth
R incomplete, L incomplete	moderate in middle & post. fossæ	dead at birth
R incomplete, L none	extensive, in all fossæ	no note
R incomplete, L incomplete	extensive, in all fossæ	dead at birth

List of Cases of Torn Tento

No.	*Para.*	*Length.*	*Presentation.*	*Complications and Operations.*	*Natur*
40	V	51	breech by version	transverse, prolapse of cord, version	R comp
41	II	51	breech by version	placenta prævia	R incon
42	I	49	breech by version	contracted pelvis, forceps, prolapse of cord, version	R comp
43	I	48	breech by version	brow presentation, forceps, version	R incon torn
44	I	53	vertex O.P.	difficult forceps	R comp
45	II	50	vertex, O.A.	long 2nd stage, natural delivery	R none
46	VIII	45	primary breech	difficult delivery of head	R comp
47	V	48	vertex	prolapse of cord, forceps, rapid delivery	R incon
48	V	37	vertex	accidental hæmorrhage, natural delivery	R incon
49	IV	32	transverse	spontaneous evolution	R comp
50	X	46	vertex	placenta prævia, pituitrin	R inco
51	X	51	breech by version	brow presentation, version	R comp
52	VIII	47	vertex, O.A.	forceps, difficult extraction	R comp
53	VI	45	vertex	prolapsed cord, natural delivery, second of twins	R comp
54	VII	41	breech by version	placenta prævia, version	R com
55	III	38	breech by version	placenta prævia, version	R com
56	I	47	vertex	contracted pelvis, forceps	R inco
57	I	51	vertex	placenta prævia, bag, natural delivery	R inco
58	I	49	vertex O.P.	long labour, manual rotation, forceps	R inco
59	I	56	primary breech	difficult delivery of head by forceps	R com
60	I	50	vertex, O.A.	forceps, long 2nd stage	R com
61	VII	46	vertex	placenta prævia, bag, natural delivery	R com
62	I	47	vertex, O.A.	long 2nd stage, forceps, first of twins	R non
63	XI	52	primary breech	easy delivery	R com
64	I	45	vertex, O.A.	natural delivery	R non
65	V	49	vertex, O.A.	precipitate labour, cardiac disease	R com
66	VI	50	breech by version	placenta prævia, version	R com
67	XI	52	breech by version	contracted pelvis, prolapse of cord, version	R com
68	III	41	vertex	accidental hæmorrhage, natural delivery	R com
69	X	54	primary breech	body born long before arrival of doctor, delivery of head difficult	R com
70	I	50	vertex	rapid labour, induction for albuminuria	R com
71	I	52	vertex, O.A.	Natural labour, cord tightly round neck	R non
72	I	53	primary breech	arms extended	R com
73	VI	51	breech by version	placenta prævia, version, one of twins	R inc
73	VI	54	breech by version	placenta prævia, version, one of twins	R inc
74	II	51	vertex, L.O.P.	natural delivery	R cor
75	VIII	49	face	long labour, natural delivery	R cor
76	I	51	vertex, O.A.	forceps for long 2nd stage	R cor
77	I	50	vertex, O.A.	contracted pelvis, forceps, difficult extraction	R cor
78	I	50	vertex, O.A.	contracted pelvis, forceps	R cor
79	V	52	vertex, O.A.	natural delivery	R inc
80	VIII	55	vertex O.P.	forceps, difficult extraction	R cor

Tentorium Cerebelli.—continued

Nature of Tear in Tentorium.	*Hæmorrhage.*	*Condition of Fœtus at Birth.*
R complete, L incomplete	moderate	heart beating after birth
R incomplete, L incomplete	none	no note
R complete, L complete	extensive	dead at birth
R incomplete, L incomplete, falx torn	moderate, middle & post. fossæ	no note
R complete, L complete	extensive, middle & post. fossæ	dead at birth
R none, L complete	extensive, middle & post. fossæ	heart beating after birth
R complete, L complete	extensive, in all fossæ	heart beating after birth
R incomplete, L none	slight	dead at birth
R incomplete, L incomplete	none	heart beating after birth
R complete, L complete	extensive	no note
R incomplete, L none	none	no note
R complete, L complete	moderate, middle & post. fossæ	heart beating after birth
R complete, L complete	moderate, middle & post. fossæ	heart beating after birth
R complete, L complete	extensive	dead at birth
R complete, L complete	moderate	no note
R complete, L complete	moderate	no note
R incomplete, L incomplete	moderate	dead at birth
R incomplete, L complete	moderate	dead at birth
R incomplete, L none	moderate	no note
R complete, L complete, falx torn	moderate	dead at birth
R complete, L complete	extensive	heart beating after birth
R complete, L complete	extensive	no note
R none, L complete	slight	no note
R complete, L complete	moderate, in post. fossæ	no note
R none, L incomplete	slight	no note
R complete, L complete	moderate	no note
R complete, L complete	extensive	dead at birth
R complete, L complete	extensive, in all fossæ	dead at birth
R complete, L none	moderate	heart beating after birth
R complete, L complete	moderate	dead at birth
R complete, L incomplete	extensive	no note
R none, L incomplete	moderate	dead at birth
R complete, L complete	extensive	heart beating after birth
R incomplete, L incomplete	slight	dead at birth
R incomplete L incomplete	none	dead at birth
R complete, L none	moderate	dead at birth
R complete, L complete	moderate	no note
R complete, L incomplete	moderate, middle & post. fossæ	heart beating after birth
R complete, L incomplete	extensive, middle & post. fossæ	dead at birth
R complete, L incomplete	slight	heart beating after birth
R incomplete, L incomplete	moderate, middle & post. fossæ	dead at birth
R complete, L complete	extensive, in all fossæ	dead at birth

Intracranial Traumata in the Newborn.*

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Introduction.

During recent years numerous observers have studied the pathological lesions that may occur within the fœtal head during labour. Special attention has been directed to lacerations of the dura mater and to the occurrence of hæmorrhage; and the importance of various obstetrical factors in the causation of these traumata has been emphasized. Further, these investigations possess a practical interest in so far as the infant is concerned, for they suggest methods of treatment which are certainly worthy of further trial.

In this paper is included a study of 80 neonatal deaths and stillbirths; but since I was unacquainted with the method of treatment by lumbar puncture until a late stage in the examination of this series, the cases so treated are not yet numerous enough to justify definite conclusions. Only a brief outline of the treatment recommended will therefore be given in the present communication.

Anatomy and Physiology.

During a normal labour the following three factors are important in safeguarding the life of the fœtus:—

i. The mobility of the bones of the cranial vault. This permits a gradual moulding of the fœtal head, and protects the brain from sudden and severe damage. The degree of moulding is restrained by the intracranial dural septa, the action of which as controlling ligaments has been described and demonstrated by Eardley Holland[1].

ii. The presence of membranous fontanelles and sutures allows an increase in cranial volume to occur, for example, during cerebral and meningeal congestion, without a dangerous rise in intracranial tension.

iii. The low excitability of the fœtal respiratory centre, still further reduced during the normal asphyxia of birth, prevents premature respiration.

* The expenses of this investigation have been defrayed by a grant from the Medical Research Council.

In dystocia, head-moulding is frequently excessive, and cerebral contusion results; if the dural septa be torn, greater damage to the brain may occur. Further, lacerations of the dura mater may cause rupture of blood-vessels with hæmorrhage.

When the intracranial volume is greatly increased by intense congestion and œdema, or by bleeding, the distensibility of the fœtal skull is not great enough to prevent a dangerous increase in intracranial tension. In such circumstances fœtal asphyxia is pronounced, the excitability of the respiratory centre being so reduced that even artificial stimuli may fail to call forth a response, and the infant then dies of atelectasis.

It is not necessary to describe the anatomy of the dura mater, of which a full account is given by Eardley Holland[1]. But it is interesting to note how closely the radiating fibrous bands resemble the spokes of a bicycle-wheel. This arrangement is obviously well-suited to resist excessive stress during cranial distortion of labour. References will be made in the next section to the most frequent sources of hæmorrhage.

Pathology.

Thomas Radford[2] reported that he found intracranial hæmorrhage in two infants born after difficult labours. Among recent observers, Warwick[3] found that in a series of 36 stillbirths and neonatal deaths, 50 per cent. showed intracranial hæmorrhage; Schäfer[4] found this percentage to be 20 in a series of 680 autopsies upon newly-born infants; and of his cases of hæmorrhage, 71.4 per cent. showed lacerations of the dural septa. Ehrenfest[5] claims that tentorial ruptures occur in 30 to 40 per cent. of fœtal and neonatal deaths occurring during or soon after delivery. Eardley Holland[1] found these ruptures to be present in 81 of 168 fresh fœtus, that is, in 48 per cent. Subdural cerebral hæmorrhage had occurred in all but six of the fœtus showing dural lacerations.

This evidence demonstrates the frequency of grave intracranial trauma with hæmorrhage. It is probable, however, that the lesser degrees of damage to the cranial contents have not received the attention which they deserve because at autopsy the macroscopical lesion is not striking.

Venous congestion of the fœtal brain and meninges occurs during a normal labour. When it is developed to an excessive degree it may be no less dangerous to the fœtus than a large subdural hæmorrhage. It is a type of birth-trauma which must be fully considered not only because of its serious effects, but because it appears to be more easily and satisfactorily treated than are the grave intracranial injuries.

Intracranial birth-lesions may be divided into two groups: those associated with intracranial hæmorrhage, and those in which intracranial hæmorrhage has not occurred.

Cases Associated with Intracranial Hæmorrhage.

In a majority of examples included in this subdivision ruptures of the dural septa are found. These tears are usually tentorial, but lacerations of the falx cerebri may be seen occasionally in cases delivered in persistent occipito-posterior positions.

The tentorium may be torn on one or on both sides; the half which corresponds with the leading parietal bone is usually the more liable to injury.

Tentorial ruptures may be complete, that is to say, they may involve the whole thickness of the septum; or they may be incomplete, in which case only one of the tentorial layers, commonly the superior, is torn.

Hæmorrhages may take place from the following sources:—

(1) *Small tentorial vessels*, coursing among the fibres of the tentorium cerebelli, may be torn; the blood then collects in a film upon the upper surface of the cerebellum or upon the upper tentorial surface, draining posteriorly around the occipital lobes. The small venous effusions, amounting only to purple stains, which are not infrequently seen amidst the fibres of the dural septa, are of no clinical significance.

(2) *Vena magna Galeni*, which is frequently distorted during moulding of the head, may rupture at the point where the straight sinus is formed. The blood collects posteriorly to the mesencephalon, and drains downwards around the cerebellum, pons and medulla.

(3) *Cerebral veins*, near their terminations in the superior longitudinal sinus, may be injured. Cushing[6] has pointed out that these veins are inadequately supported as they traverse the subdural space, and are frequently distorted, sometimes with rupture, during parietal overriding. The effused blood flows downwards in the subdural space. Usually the hæmorrhage is unilateral, but sometimes it is bilateral.

(4) *Superior longitudinal sinus, transverse sinus and straight sinus.* It is only in the most severe types of birth-injury that such examples are found. The infant is almost invariably stillborn.

(5) *The internal cerebral veins*, for instance the choroidal veins, may be damaged. These examples are rare, and are found almost exclusively in stillborn premature infants. The blood-collection may occupy the lateral, the third and the fourth ventricles; blood is also frequently found in these cases within the spinal membranes.

Instances of intracranial hæmorrhage without injury to dural

septa are infrequent. In these cases bleeding is caused by the rupture of vessels while in a state of congestion.

Lesions characteristic of asphyxia are found in the thorax and abdomen; that is to say, the lungs are atelectatic; the cardiac auricles and large veins are congested with dark-coloured fluid blood, and small ecchymoses may be seen scattered about the heart, pericardium, lungs and pleuræ. The viscera are congested, and may be the seat of hæmorrhages. This lesion is seen most frequently in the suprarenal glands of premature babies, and is said to be especially frequent when the infant has presented by the breech.

Cases in which Intracranial Hæmorrhage has not Occurred.

In these examples, in which death probably results from compression and asphyxial poisoning of the vital nerve-centres in the medulla, it is usual to find general congestion of the intracranial venous sinus and their tributary veins and of the choroid plexus. The meninges present a watery appearance, and the brain appears to fit the cranial cavity more closely than usual; its substance is congested and slightly œdematous. The cerebrospinal fluid is usually increased in volume. There may be slight lacerations of the dural septa, especially of the tentorium cerebelli.

In a majority of cases asphyxial lesions are found in the thorax and abdomen of the infant.

Ætiology.

The production of intracranial trauma may be due to predisposing and determining causes.

Predisposing Causes.

Prematurity is undoubtedly of great importance. The softness and mobility of the cranial bones, as well as the immaturity of the vessel-walls render premature fœtus peculiarly susceptible to the effects of moulding and of asphyxia; not only intracranial, but also subpleural, subepicardial, visceral and retinal hæmorrhages occur with unusual frequency when the vessel-walls are weak. If the fœtus is also the subject of congenital disease, such as syphilis, it is probable that the vessel-walls are still more fragile, and more liable to suffer damage during labour.

The hæmorrhagic diathesis, as a predisposing factor in the causation of intracranial hæmorrhage, has been especially emphasized by American investigators. The average blood-coagulation time in the newborn infant is five to nine minutes. Rodda[7] has shown that this interval normally becomes prolonged up to the fifth day of life, and returns again to its previous figure

by the tenth day. It is reasonable to assume that in certain infants the coagulation time may be considerably longer than normal, and that in such cases grave danger may arise. But it is unlikely that the bleeding tendency is common. If it were, the mortality-rate of newborn babies would be very high, for even a very minute vascular rupture—possibly a frequent occurrence even in normal deliveries—would then give rise to dangerous and perhaps fatal hæmorrhage.

Determining Causes.

These are numerous, and do not admit of satisfactory classification. A useful practical subdivision is as follows:—

(i) Causes of excessive head-moulding.
(ii) Causes of too-rapid head-moulding.
(iii) Causes of fœtal asphyxia.

In a majority of cases those factors which produce either excessive moulding or too-rapid moulding give rise at the same time to fœtal asphyxia.

Causes of excessive head-moulding. The most important cause is disproportion in size between the maternal bony pelvis and the fœtal head; for example, pelvic contraction and oversize of the fœtus. Deficient cephalic flexion, the rigid cervix and outlet of the primigravida, and pelvic growths are less frequent causes. Some writers (Holland[1], Ehrenfest[5]) have called attention to the fact that measures undertaken to support the perineum may be so vigorously carried out that intracranial trauma is caused by compression of the squamous occipital bone against the maternal pubic arch.

Causes of too-rapid head-moulding. Delivery which takes place very rapidly, even when spontaneous, is dangerous to the fœtus, especially in breech presentations. In these circumstances dilatation of the maternal passages is inadequate and gradual head-moulding cannot occur. On these grounds Ehrenfest[5] and others pointed out the possible dangers of pituitary extract.

Causes of fœtal asphyxia. As previously mentioned, extreme intracranial congestion occurs in most cases of difficult labour. As a result the distended vessels are more liable to rupture during cranial distortion, and occasionally the distension itself is sufficient to break the vessel-wall.

Certain other conditions, for example, prolapse of the umbilical cord, accidental hæmorrhage, placenta prævia, and torsion of the umbilical cord around the fœtal neck, may produce fœtal asphyxia without excessive moulding. Moreover, in a slow but otherwise normal labour, a dangerous degree of intracranial congestion may develop.

Attention must also be drawn to the possible influence of forceps, and of the methods of resuscitation in producing intracranial trauma. Forceps have been unjustly blamed. Abt [8] states that it has been estimated that 30 to 40 per cent. of infants delivered by instruments suffer intracranial hæmorrhage. Except when forceps are applied too early in the labour, or when the premature infant is delivered too rapidly, it is probable that the conditions which are the indications for the use of forceps are also mainly responsible for any fœtal lesion which may occur.

The various methods of resuscitation have been suggested by Ehrenfest [5] as causes of intracranial damage. Though it is unlikely that treatment would be so vigorously performed as to cause intracranial trauma, aggravation of damage suffered during labour and the re-starting of hæmorrhage when clotting has just begun may follow certain of the more forcible methods. The "swinging" method, and the holding of the infant head downwards, would appear to be especially dangerous.

In a few cases none of the above determining causes can be traced. The infant born at the end of a normal pregnancy may suffer intracranial trauma during a labour which is apparently perfectly normal. It is in these cases, which are certainly uncommon, that the idea of the presence of the hæmorrhagic diathesis finds its strongest support.

Diagnosis and Prognosis.

In the diagnosis of intracranial trauma in the living newborn baby, the obstetrical history of the mother, and accurate details of the labour should be ascertained. External evidence of cranial stress may be present in the form of scalp injuries, extensive formation of caput succedaneum, cephalhæmatomata, excessive moulding, bone fracture or depressions; but these signs may be absent even in the most severe forms of intracranial trauma.

Clinical signs are usually present at birth, or develop shortly after; occasionally they are absent until the fourth or fifth day of postnatal life.

The most frequent sign of cranial stress is an abnormal colour of the fœtal skin. Instead of the rosy pink of the healthy newborn baby, a bluish asphyxial colouration is seen; it is most prominent upon the face and feet. The lips may be surrounded by a pallid zone; in more severe cases, white rather than blue is the prevailing colour. Frequently the early asphyxia appears to be satisfactorily overcome by treatment. In a majority of cases the respirations are shallow, irregular and slow, and the pulse is infrequent and full.

Disinclination to suck is a very important feature; the swallowing reflex may be lost in the more severe examples.

Epistaxis and pharyngeal bleeding often occur. If the intracranial hæmorrhage be progressive there may be slight pyrexia.

When there has been diffuse bleeding into the cranial cavity, for instance in the subdural or subarachnoid space, there may be no localizing sign; but if a circumscribed hæmatoma has formed, a study of the nervous manifestations may provide information as to its probable site. If the blood is collected chiefly above the tentorium cerebelli the nervous signs are cortical in nature. The child is quiet and restless by turns; he resents handling and occasionally gives a sharp scream reminiscent of the "hydrocephalic cry." Spasms of the facial and limb muscles, which are not infrequently unilateral, may occur, and are of great diagnostic significance.

There may be nystagmus and ocular palsies; the pupils, which react only feebly to light, may be unequal. Myosis and ptosis, when present, are usually found on the same side as the hæmorrhage.

The anterior fontanelle is tense; generally it is not pulsatile. If the intracranial hæmorrhage be copious, the anterior fontanelle and the eyes may protrude. Yawning and sighing frequently occur.

Convulsions may develop in any case of intracranial hæmorrhage, but are more frequent when the bleeding is cortical; they are usually bilateral and are of special significance when observed soon after birth.

Automatic muscular movements, for instance alternate closing and opening of the eyelids, may occur.

Medullary signs, such as irregular respiration and cyanosis, when present, develop later in the course of the illness. When the bleeding is mostly below the tentorium cerebelli, surrounding the cerebellum and medulla, bulbar signs supervene early. The infant is lethargic and quiet, but may take the breast at first. The muscular system is in a state of hypertonus characterized by rigidity of the neck and limbs, with occasional clonic contractions. These spasms are especially frequent with bleeding in the posterior fossa.

The muscular excitability is exaggerated and the reflexes are brisk; there may be erection of the penis and wrinkling of the scrotal skin.

Bulging of the anterior fontanelle may be seen as a late manifestation. Paralysis is not usually a prominent feature. Cyanosis develops, and respiration may be irregular or of the Cheyne-Stokes type. Reflexes disappear and general convulsions usher in the termination of life, generally before the third day.

Hæmorrhage into the lateral ventricles causes symptoms and signs resembling those found in infratentorial bleeding; if con-

vulsions develop they may be confined to the face. Medullary symptoms are speedily produced by hæmorrhage into the fourth ventricle and spinal canal.

In most cases of intracranial hæmorrhage the third or fourth day is the turning-point. Deaths directly due to hæmorrhage usually occur before the fourth day; atelectasis or aspiration pneumonia may produce a fatal termination between the fourth and tenth days.

In cases which recover, paralysis is not usually noticed until several months have elapsed.

The importance of lumbar puncture in the diagnosis of intracranial hæmorrhage is very great; and in view of its probable value as a therapeutic measure it is a procedure which should be undertaken without delay in suspected cases. The technique of this operation does not differ from that employed for adult patients, and the ordinary lumbar puncture needle is quite serviceable. There appears to be no danger in withdrawing cerebrospinal fluid so long as the rate of flow is faster than normal. The greatest volume removed at one puncture in this series of cases was 15 c.cms. The colour and opacity of the fluid varies with the proportion of admixed blood and with the time which has elapsed since hæmorrhage took place. At the first puncture the fluid may closely resemble whole blood; while at a later puncture performed after the interval of a few days, it is found to be bright yellow in colour, almost transparent, and to contain but few erythrocytes which settle to the bottom of the test-tube as a small red deposit. The albumen content is considerably greater than normal.

Abt [8] and other writers have claimed the diagnostic value of subdural puncture through the external angle of the anterior fontanelle in cases of suspected supratentorial hæmorrhage.

If physical signs point to a progressive hæmorrhage, and the temperature is above normal, it may be of value to test the blood-coagulation time in order to ascertain whether the hæmorrhagic diathesis is causing continued bleeding.

While it is usually easy to recognize all but the slightest cases of birth-trauma, it is extremely difficult to diagnose accurately the nature of the lesion; especially when the infant is premature, of poor colour, with shallow respirations and partial atelectasis.

Premature and full-time infants suffering with intracranial congestion produced during delivery may develop many signs noticed also in the subjects of intracranial hæmorrhage: a bulging fontanelle, cyanosis and pallor, shallow whining respirations, twitchings and convulsions, and failure to suck may all occur in the absence of free bleeding. When general congestion has been severe enough to cause hæmorrhage into viscera, such as the supra-

renal glands and kidneys, shock is profound, and the infant may appear to be the subject of severe intracranial hæmorrhage. Recognition of these facts emphasizes the importance of early lumbar puncture.

The immediate prognosis of intracranial trauma is favourable if the infant survives the fifth day, maintains a normal temperature and takes feeds satisfactorily. Abt [8] states that the degree of asphyxia at birth is a guide in prognosis. Danger is constant so long as the colour of the infant's skin does not return to the normal rosy-pink. Twitchings and convulsions are always of grave significance; and protrusion of the anterior fontanelle, with a sensation of tenseness on palpation, should be regarded with misgiving.

Complications and Sequelæ.

Brief reference only will be made to the complications and sequelæ of intracranial trauma.

Complications.

1. Other injuries to the head, for instance, scalp wounds and fractures of the cranial bones.
2. Injuries to other parts of the fœtus, such as fracture of the clavicle or humerus and separation of the vertebral epiphyses.
3. Prematurity of the fœtus, frequently with atelectasis and broncho-pneumonia.
4. Septic infection of an intracranial hæmatoma, with suppurative meningitis.
5. Visceral hæmorrhages.

Sequelæ.

1. Permanent paralysis.
2. Pathological mental and moral conditions, including weak-mindedness, idiocy and epilepsy.

Treatment.

It is unnecessary to emphasize the fact that treatment is a poor substitute for prevention. The general principles of prophylaxis are well known, and in this paper they have already been enunciated, though indirectly, in regard to ætiology.

The treatment of intracranial traumata may be briefly summarized as follows:—

1. The infant should be handled as little as possible. If resuscitation is necessary, the less vigorous methods are advisable.
2. The body-temperature must be maintained by means of hot bottles.

3. Early lumbar puncture appears to relieve cerebral congestion and to assist respiration. The operation should be repeated so long as the anterior fontanelle protrudes. Convulsions are invariably an indication for immediate lumbar puncture.
4. Since the sucking reflex is so frequently diminished or lost, feeding must in many cases be carried out with the pipette. If the swallowing reflex be impaired, sterile water should be given in preference to dilute milk.
5. Continued bleeding may be checked in some cases by an intramuscular injection of 10 c.cms. of human or horse serum, repeated four times if necessary at intervals of three or four hours.
6. Major operation appears to be contra-indicated except in those rare cases in which clinical signs and symptoms point definitely to a local cortical effusion of blood.

Report on 80 Neonatal Deaths and Stillbirths.

It must be pointed out that the cases here reviewed were not specially selected as probable examples of intracranial birth-trauma. They formed an almost consecutive series of autopsies.

For the purpose of this study, blood-effusions occurring into the substance of the dural septa have not been regarded as intracranial hæmorrhage, since it is probable that these bleedings are not in themselves dangerous to the newborn infant.

Neonatal Deaths (28 Cases).

(1) Intracranial hæmorrhage occurred in 6 cases (21.4 per cent.).
(2) Intracranial hæmorrhage did not occur in 22 cases (78.6 per cent.).

Cases in which intracranial hæmorrhage occurred. Four of these cases (*i.e.*, 66.6 per cent.) showed lacerations of the dural septa. The tentorium cerebelli was ruptured on both sides in one case, on the left side in two cases, and on the right side in one case. In all these examples the hæmorrhage was subdural and occurred especially in the region of the tentorium cerebelli. In one case there was also a blood-clot in the right lateral ventricle and its descending cornu. Dural injuries did not occur in two instances. One of these showed small cortical blood-effusions; in the other there was a blood-clot upon the dorsal surface of the mesencephalon in the region of the vein of Galen, and bleeding had also occurred into the left lateral ventricle, the fourth ventricle and slightly into the right lateral ventricle. In the spinal canal of this infant peridural and intrathecal hæmorrhages were found. Signs of general tissue asphyxia were invariably present in these cases of intracranial hæmorrhage. Atelectasis was frequent; acute

œdema had developed in expanded portions of lung. The viscera showed vascular congestion; in one case hæmorrhage had occurred into the right suprarenal gland, and in another case into the thymus. Three of the infants were premature, and three were probably full-time. The average weight was 5 lbs. 9½ ozs. Two of the mothers were primigravidæ, three had given birth to two children and one to four.

Delivery took place by the vertex four times (two right occipito-anterior and two left occipito-anterior), by the breech once (internal version for shoulder presentation and placenta prævia), and by Cæsarean section once (for shoulder presentation and placenta prævia). In the last-mentioned case the patient had been in labour for six and a half hours when the operation was performed. There was a slight superficial laceration of the right half of the tentorium cerebelli; hæmorrhage had probably originated from congestive ruptures of cerebral veins.

Forceps were used on two occasions; one, a difficult mid-forceps delivery of a large infant (9 lbs. 15 ozs.); the other, a low-forceps delivery of a premature infant after induction of labour on account of maternal cardiac disease. In another of the vertex cases tight coiling of the umbilical cord around the neck of the infant probably caused congestive ruptures of cerebral veins; the dural septa were uninjured in this case.

The average duration of neonatal life was almost 15 hours, Four of the infants were born in a condition of white asphyxia, and one showed blue asphyxia. The sixth infant appeared normal at birth, but later became cyanosed. Convulsions occurred in only one case.

Cases in which intracranial hæmorrhage did not occur. These cases may be further sub-divided as follows:—

(*a*) Intracranial congestion with dural lacerations ...	3	22
(*b*) Intracranial congestion without dural lacerations	15	
(*c*) No pathological intracranial vascular lesion.....	4	

Cases of intracranial congestion with dural lacerations.

The first example was an infant weighing 6 lbs. 3 ozs.; it was born in the right sacro-posterior position and was the first of twins. The mother was a primigravida; her pelvic measurements were: interspinous 10 ins.; intercristal 11¼ ins.; external conjugate 7⅝ ins. White asphyxia was present at birth; the infant's condition improved with resuscitation, but it died at the age of 49⅓ hours. The cause of death was pleuro-pneumonia, probably contracted during or immediately after delivery. The presence of this disease complicated the interpretation of the intracranial findings. There were slight superficial lacerations of both halves of the tentorium cerebelli and slight blood-effusion had taken place into the substance of this dural septum; there was slight general intracranial congestion. It is

very probable that the condition of asphyxia pallida noted at birth was attributable to intracranial congestion caused by trauma during delivery. The twin infant survived.

The second example was an infant weighing 7 lbs. 9 ozs, born after induction of premature labour on account of pelvic contraction, the mother having previously given birth to seven children. The measurements were: interspinous $9\frac{1}{4}$ ins.; intercristal $10\frac{1}{8}$ ins.; external conjugate $7\frac{3}{8}$ ins.; diagonal conjugate $3\frac{3}{4}$ ins.

Delivery took place rapidly in the left occipito-anterior position; hydramnios was present and the infant was born in a state of blue asphyxia; liquor amnii flowed away freely from the mouth. In spite of treatment life lasted only 40 minutes. The left half of the tentorium cerebelli was found to be very slightly torn; blood-effusion had occurred amidst the ruptured fibres and also into the falx cerebri and falx cerebelli. There was general intracranial and visceral congestion and atelectasis.

The third example, an infant weighing only 4 lbs. $\frac{1}{4}$ oz., was born at the 34th week after podalic version on account of placenta prævia, the mother having previously given birth to five children. The infant was in a state of asphyxia livida and survived 59 hours. The left half of the tentorium cerebelli showed a slight superficial laceration and was stained with blood. There were meningeal œdema and slight intracranial congestion. The lungs were partially atelectatic.

Cases of intracranial congestion without dural lacerations.

In eight of the fifteen cases placed in this category, intracranial congestion must be ascribed to causes other than trauma of labour. Deaths were due in these examples to the following causes:—

(1) Prematurity and atelectasis (accidental hæmorrhage). Weight of infant=2 lbs. 12 ozs.
(2) Syphilitic cachexia. Infant lived 10 days 15 hours.
(3) Prematurity and atelectasis (accidental hæmorrhage). Weight of infant=3 lbs. 11 ozs.
(4) Congenital cardiac disease.
(5) Prematurity and marasmus (maternal cardiac disease). Infant lived 21 days.
(6) Prematurity and atelectasis (unknown cause). Weight of infant=3 lbs. 3 ozs.
(7) Prematurity and atelectasis (accidental hæmorrhage). Weight of infant=3 lbs. 1 oz.
(8) Multiple deformities of the fœtus.

In reviewing the remaining seven cases of this subsection—cases in which intracranial congestion was attributable to damage during labour—it is found that four of the mothers were primigravidæ, two had given birth to two children, and one to three. The duration of pregnancy was full-time in three cases; of the other four cases, two were about 38 weeks, one was 37 weeks, and one was $35\frac{4}{7}$ weeks. In six cases delivery occurred by the vertex (three left occipito-anterior; two right occipito-anterior; one position not stated), and in one case by the breech (right sacro-anterior). Induction of premature labour was performed in three cases; in two of these on account of pelvic contraction and in one for maternal cardiac disease. Of the other cases, the pelvis was flat in one, small round in one and slightly smaller than normal in two.

Forceps were used in two cases; one was a difficult delivery, the other a low operation.

The average weight of the infants was 5 lbs. $13\frac{1}{3}$ ozs., and the average duration of life $30\frac{1}{2}$ hours.

The clinical signs were as follows:—White asphyxia, three cases; blue asphyxia, two cases; poor general condition, two cases. Convulsions occurred in one instance; rhythmic and tetanic muscular spasms, and irregular muscular twitchings were each noted in one case.

In a majority of cases general visceral congestion and partial atelectasis were found.

Cases in which no pathological intracranial vascular lesion was found.

Four cases did not show any vascular lesion attributable to the process of birth, and the dural septa were uninjured. The causes of death in these cases were respectively icterus neonatorum and omphalorrhagia; meconium-suffocation; prematurity and broncho-pneumonia; and ileo-colitis with melæna.

These cases need not be further considered in this paper.

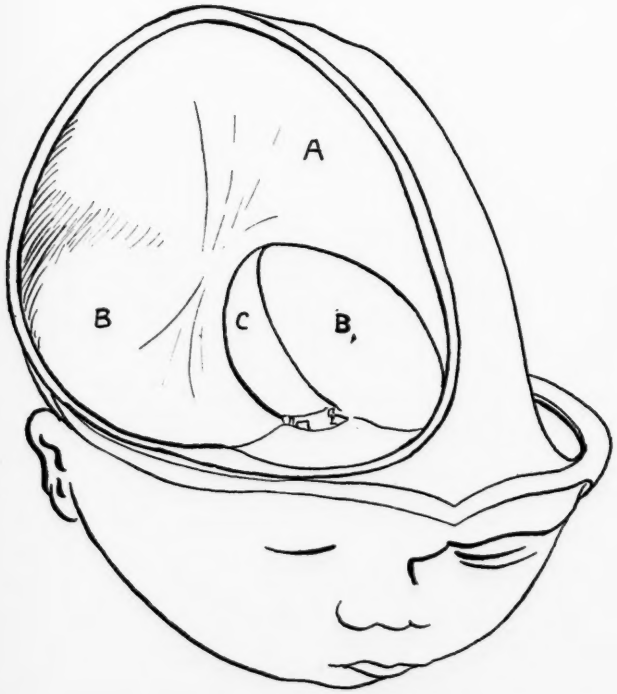
STILLBIRTHS (52 CASES).

(1) Intracranial hæmorrhage occurred in 24 cases (46.1 per cent.).
(2) Intracranial hæmorrhage did not occur in 28 cases (53.9 per cent.).

Cases in which intracranial hæmorrhage occurred. Twenty-three of these cases (96 per cent.) showed lacerations of dural septa. The tentorium cerebelli was ruptured on both sides in eighteen cases, on the left side in two cases, and on the right side in two cases. The falx cerebri was ruptured in two cases; in one it was the only dural injury found, and in the other it occurred together with a laceration of the right half of the tentorium cerebelli.

In a majority of cases diffuse hæmorrhage into the subdural space was found; in two cases in which the collection of blood was more localized in the vault region, it appeared to have originated from ruptured cerebral veins rather than from lacerations of the dura mater. One of these cases (Fig. 1) was the single instance of intracranial hæmorrhage without dural laceration; the etiology of this bleeding is complicated by the fact that the mother had six eclamptic convulsions before the birth of the fœtus. In four instances hæmorrhage had taken place into the iter of Sylvius; and in two instances blood-clot was found in the lateral ventricle. Only in one case was a rupture of the straight sinus demonstrated.

The following associated injuries were encountered. In three cases there was separation of an epiphysis from the body of a spinal vertebra; these were the sixth cervical, seventh cervical and third thoracic vertebræ respectively. In each instance there was much bleeding, both extradural and intradural, within the spinal canal. Delivery had taken place in each case by the breech.



Key to Fig. 1.—A. Falx cerebri. B. Tentorium cerebelli. C. Incisura tentorii

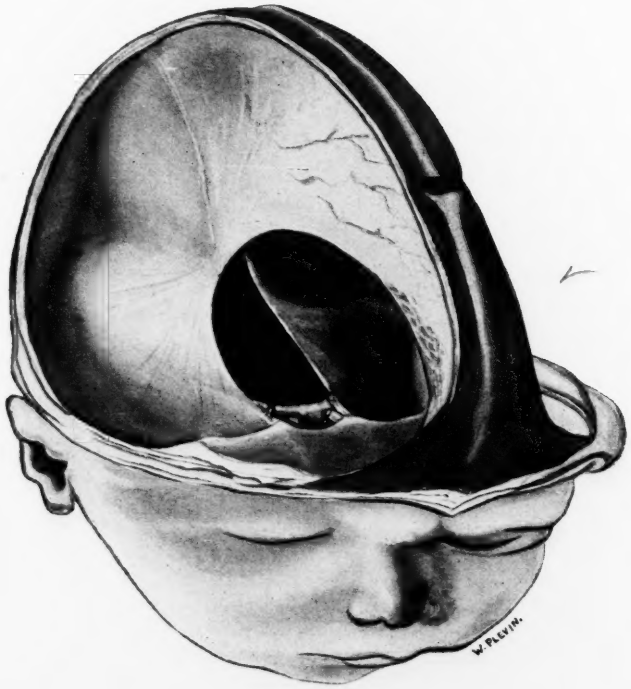


Fig 1.—(Approximately normal size). Intracranial dural septa are uninjured. Subdural hæmorrhage was mainly over the vertex of the brain, and therefore is not seen in the figure.

Two other fœtus showed the presence of intraspinal hæmorrhage, but without bone injury; one of these was delivered by the breech and the other by the vertex—the last a difficult mid-forceps delivery.

In four cases there were fractures of the cranial vault bones; in one case both parietal bones were fractured; in two cases, the right parietal; and in one case, in addition to a fracture of the right parietal bone, there was a gutter depression of the right frontal bone. Delivery took place by forceps in all these cases of fracture. In one of them the large size of the fœtus (9 lbs. 1 oz.) was the cause of the obstruction; in another, multiple small uterine fibroids were present, and the fœtus was large (8 lbs. 12 ozs.). The other two cases were examples of pelvic contraction; in one the pelvis was very flat, and induction of premature labour had been employed; in the other the pelvis was generally contracted with a little flattening.

Signs of general tissue asphyxia were almost invariably found; the lungs were atelectatic, and the viscera were congested with venous blood. Subcapsular hepatic hæmatomata were found in three cases; the blood-collection had ruptured into the peritoneal cavity in one of these fœtus. Also in three cases were noted small hæmorrhages into the connective-tissue surrounding the pelvis of the ureter within the kidney sinus.

The average weight of the twenty-four fœtus was just under 7 lbs. Only eight were premature.

More than one-half of the mothers (13 out of 24) were primigravidæ or had given birth previously to only one child. The modes of delivery were as follows:—

Vertex presentation.

Left occipito-anterior	8	13
Right occipito-anterior	2	
Left mento-anterior	1	
Right occipito-posterior	1	
Position not stated	1	

Breech presentation.

(i) *Primary Breech.*

Right sacro-anterior	1	3
Left sacro-posterior	1	
Position not stated	1	

(ii) *Breech by Version.*

Left sacro-anterior	2	5
Position not stated	3	

(iii) *Breech* (History unknown) 2

Unknown—born before arrival of midwife... 1—total, 24.

Forceps were employed in nine of the twenty-four deliveries. Reference has been made above to four of the forceps cases. Of the remaining five, two were delivered in the left occipito-anterior position, and one each in the right occipito-anterior, left mento-anterior, and right occipito-posterior (persistent) (Fig. 2) positions. The two left occipito-anterior cases were both born to primigravidæ, whose pelvic measurements were: interspinous, 9 ins.; intercristal, 10 ins.; external conjugate, $7\frac{1}{8}$ ins: and interspinous, $9\frac{3}{4}$ ins.; intercristal, $10\frac{1}{2}$ ins.; external conjugate, $6\frac{3}{4}$ ins. The fœtus weighed 7 lbs. 7 ozs. and 8 lbs. 8 ozs. (Fig. 3) respectively. The right occipito-anterior case was an instance of obstructed labour, probably due to pelvic contraction, but measurements were not obtained. The fœtus weighed 7 lbs. 2 ozs. The only previous pregnancy terminated in abortion at the third month. In the cases of breech delivery by version the indications for this treatment were:—

Placenta prævia	2	5
Transverse lie	2	
Placenta prævia and transverse lie	1	

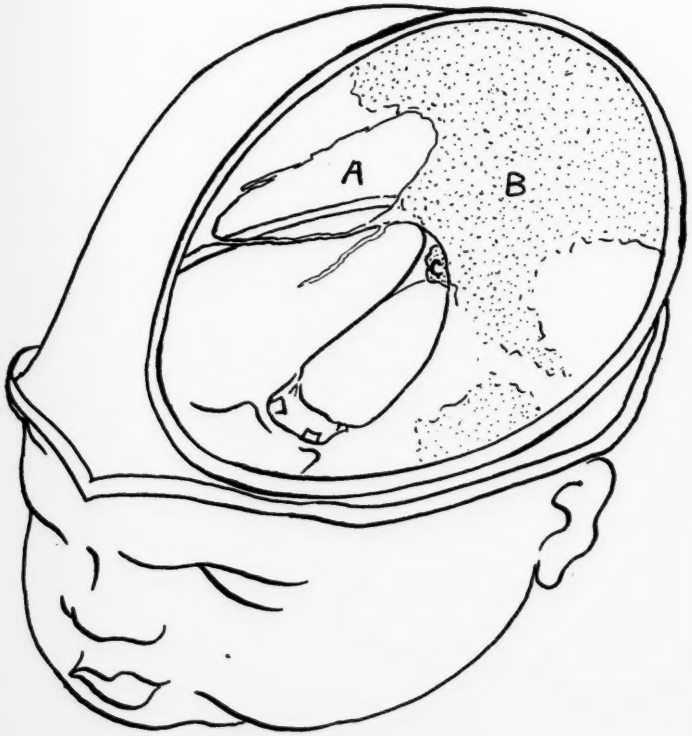
Cases in which intracranial hæmorrhage did not occur. These cases may be subdivided, as were the corresponding neonatal cases:

(*a*) Intracranial congestion with dural lacerations	8	28
(*b*) Intracranial congestion without dural lacerations	16	
(*c*) No pathological intracranial vascular lesion	4	

Cases of Intracranial Congestion with Dural Lacerations.

In seven cases both halves of the tentorium cerebelli were lacerated, though it was usual to find more severe rupture of one side than of the other. In one case, only the left half of the tentorium was torn. On the whole the lacerations were of slighter degree than those noted in cases of intracranial hæmorrhage. In no case was the falx cerebri found to be torn. General visceral congestion was noted in all these fœtus. There were no instances of visceral hæmorrhage. Three of the fœtus were premature, the average weight being 4 lbs. $12\frac{1}{2}$ ozs. The average weight of the remaining five fœtus was 7 lbs. 6 ozs.

Delivery in these cases took place respectively as follows:—Vertex, three cases (two right occipito-anterior and one left occipito-posterior); primary breech, four cases (one left sacro-anterior; three position not stated); breech by version, one case (left shoulder presentation turned to right sacro-anterior). Both fœtus delivered in the right occipito-anterior position were born spontaneously. In one case the maternal pelvic measurements were: interspinous, $8\frac{1}{2}$ ins.; intercristal, $10\frac{1}{4}$ ins.; external conjugate, $7\frac{1}{2}$ ins.; and the



Key to Fig. 2.—A. Rupture of the falx cerebri. B. Blood-clot lying upon falx cerebri, tentorium cerebelli and floor of middle fossa. C. Blood-clot at origin of straight sinus.

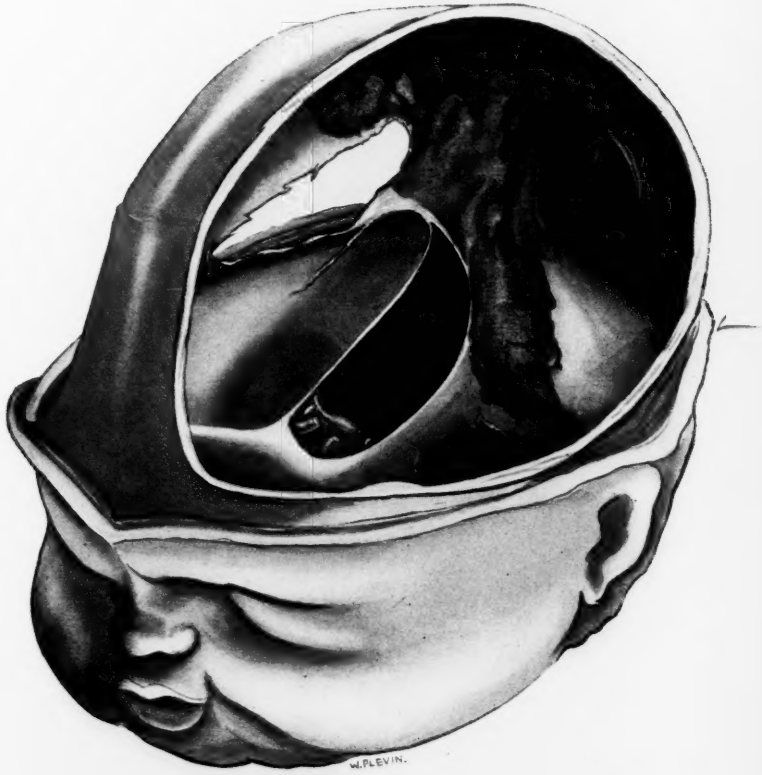
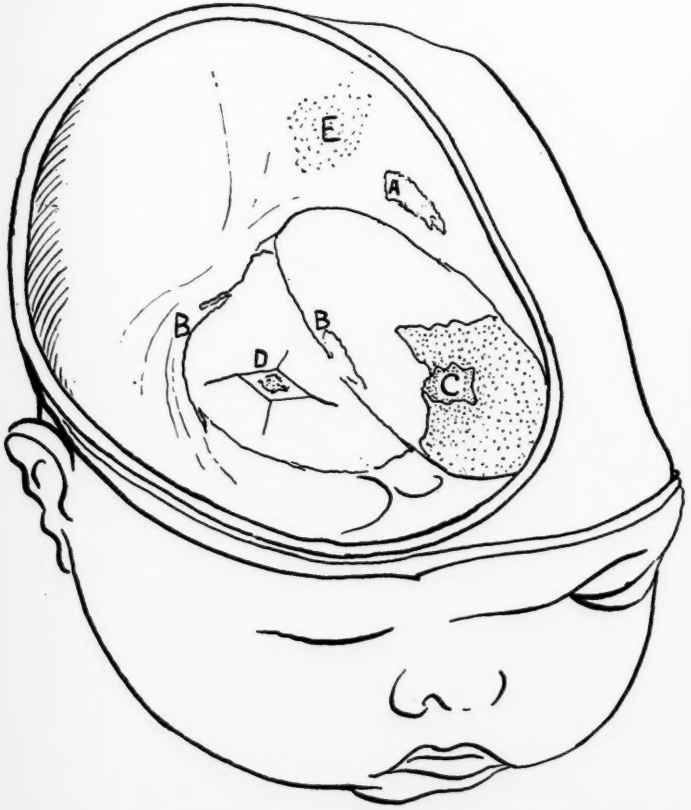


Fig. 2.—(Approximately normal size). Slight superficial lacerations of the tentorium cerebelli are concealed by blood-clot. A large rupture of the falx cerebri is shown.



Key to Fig. 3.—A. Rupture of falx cerebri. B.B. Rupture of tentorium cerebelli on each side. C. Blood-clot in left middle fossa. D. Blood-clot in 4th ventricle. E. Slight effusion of blood into falx cerebri

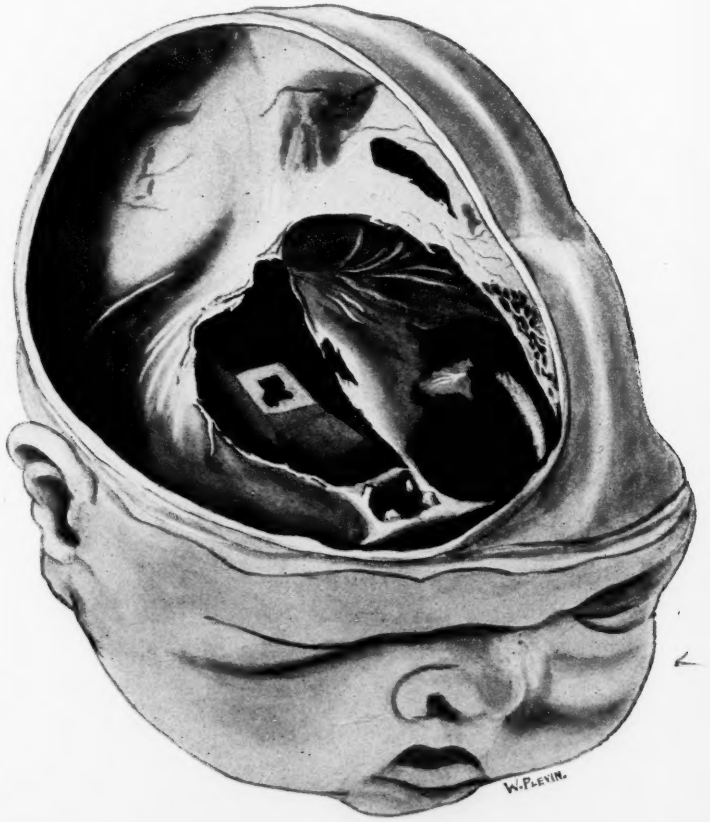


Fig. 3.—(Approximately normal size). Very extensive ruptures of the tentorium cerebelli, and lacerations of the falx cerebri are shown. Subdural and intraventricular blood-clots are present.

fœtal head showed prominent head-moulding of the " small round pelvis " type. In the other case the fœtus, weighing 7 lbs. 10½ ozs., was born at a labour only 25 minutes in duration. The mother had previously given birth to eight children. The fœtus born in the left occipito-posterior position was delivered in hospital with forceps, after failure with these instruments in the patient's home. The weight of the fœtus was 7 lbs. 4¼ ozs. The maternal pelvic measurements were: interspinous, 10 ins.; intercristal, 10¾ ins.; external conjugate 6¾ ins. There had been three previous labours, all instrumental.

Cases of Intracranial Congestion without Dural Lacerations.

(i) In five of the sixteen cases placed in this subsection intracranial congestion must be ascribed to causes other than trauma of labour. Deaths were due to the following causes:—

(1) Prematurity and atelectasis (cause unknown). Weight of fœtus = 2 lbs. 14 ozs.

(2) Prematurity (eclampsia). Weight of fœtus = 5 lbs. 10 ozs.

(3) Prematurity and atelectasis (placenta prævia). Weight of fœtus = 5 lbs.

(4) Fœtal asphyxia (accidental hæmorrhage).

(5) General œdema of the fœtus.

(ii) In two cases the fœtus, which weighed 7 lbs. 1 oz. and 7 lbs. 4 ozs. respectively, were born by normal delivery, and no cause can be given for these stillbirths. It is uncertain, therefore, whether the condition of intracranial congestion noted in these two examples can be ascribed to birth-trauma.

(iii) The state of intracranial congestion noted in the nine remaining cases in this subsection may justifiably be ascribed to birth-trauma.

In the autopsies general intracranial congestion was the most prominent feature; the dural septa showed purple-coloured patches of blood-effusion among their fibres in three cases.

Pulmonary atelectasis, with subpleural petechiæ, and general visceral congestion proved that death had been asphyxial. One case showed a subcapsular splenic hæmatoma; and in another example there were small pulmonary hæmorrhages, left suprarenal hæmorrhage and a subcapsular hepatic hæmatoma, which had ruptured into the peritoneal cavity.

One fœtus was born at the 38th week of pregnancy; it was under-developed and weighed only 4 lbs. 10 ozs. The remaining eight fœtus were apparently full-time; the average weight was 7 lbs. 9½ ozs. Four of the mothers were primigravidæ; one had given birth to two children, and the remaining four mothers to four or more children.

In five cases pelvic deformity existed. Delivery took place by the vertex in seven cases (six left occipito-anterior; one, position unstated), and by the breech after podalic version in two cases. In the vertex cases, forceps were employed on four occasions; one of these was a difficult mid-forceps delivery of a fœtus weighing 7 lbs. 15 ozs., after induction of premature labour on account of general pelvic contraction. In this case the maternal pelvic measurements were: interspinous, $8\frac{1}{4}$ ins.; intercristal, $10\frac{1}{4}$ ins.; external conjugate, $7\frac{1}{2}$ ins.; diagonal conjugate, $4\frac{1}{4}$ ins.

Prolapse of the umbilical cord occurred in three cases. Coiling of the cord around the fœtal neck probably aggravated the intracranial congestion noted in one instance. In each of the two cases delivered by the breech podalic version was performed on account of pelvic flattening. One fœtus had presented by the brow and the other by the vertex.

Cases in which no Pathological Intracranial Vascular Lesion was found.

Four fœtus, to which brief reference will now be made, did not show any vascular lesion attributable to the process of birth, and the dural septa were uninjured.

(1) A fœtus weighing 6 lbs. 4 ozs. presented by the shoulder and was delivered by podalic version. The scalp tissues contained a uniform hæmorrhagic area over the right temporal fascia; the cerebral meninges were œdematous; the right atlanto-axial articulation contained effused blood, and hæmorrhage had occurred into the left suprarenal gland. These pathological conditions which pointed to the probability of birth-trauma were not, however, supported by the presence of intracranial congestion, hæmorrhage or dural injury. No explanation can be offered for these anomalous findings.

(2) A fœtus, weighing only 3 lbs. 7 ozs., was delivered in the 33rd week of pregnancy by podalic version performed on account of placenta prævia. The brain appeared to be very white, and was surrounded by slightly turbid fluid enclosed in the subarachnoid space. Two subcapsular hepatic hæmatomata were present. It is surprising that no intracranial vascular injury had occurred.

(3) A premature fœtus, the subject of general œdema, was delivered without difficulty in the 32nd week of pregnancy.

(4) A fœtus, weighing 5 lbs. 14 ozs., was delivered by Cæsarean section on account of placenta prævia. No uterine pains had occurred before the operation was undertaken.

Summary and Conclusions.

1. Twenty-eight Neonatal Deaths.

   a. Signs and symptoms of intracranial birth-trauma occurred in 16 cases, that is, in 57.1 per cent.

b. Intracranial hæmorrhage occurred in 6 cases, that is, in 21.4 per cent.

c. Lacerations of the dura mater occurred in 7 cases, that is, in 25.0 per cent.

d. It is considered important to recognize that in seven of the sixteen cases of birth-trauma, intracranial congestion was the only pathological condition found within the fœtal skull; also that in these cases there were no visceral hæmorrhages. That is to say, in 43.7 per cent. of new-born living infants showing the effects of birth-trauma, the pathological lesion is one which is unlikely to cause the appearance of late signs and symptoms, for example, paralysis and mental changes, if satisfactory treatment were available to overcome its immediate and dangerous effects. It is possible that further observations will prove the value of early lumbar puncture in the treatment of these cases.

e. Of sixteen infants showing signs and symptoms of birth-trauma, eight were prematurely born.

2. Fifty-two Stillbirths.

a. Signs of intracranial birth-trauma occurred in 41 cases, that is, in 78.8 per cent.

b. Intracranial hæmorrhage occurred in 24 cases, that is, in 46.1 per cent.

c. Lacerations of the dura mater occurred in 31 cases, that is, in 59.6 per cent.

d. Of 41 stillborn fœtus showing evidence of intracranial trauma, 12 (that is, 29.3 per cent.) were prematurely born.

3. In this series of 80 neonatal deaths and stillbirths the relative frequency of the different fœtal presentations in cases showing signs of birth-trauma differs very little from that obtaining in the uninjured specimens.

4. Intracranial hæmorrhage occurring during labour is more frequently diffuse than localized. This fact would appear to contra-indicate surgical interference except in rare and special cases.

In carrying out this work I have been guided, stimulated and encouraged by Emeritus-Professor H. Briggs, to whom I owe a great debt of gratitude.

Professor W. Blair Bell has very kindly assisted me with his excellent advice in preparing this paper for publication.

The Honorary Staff of the Liverpool Maternity Hospital have permitted me to study the cases under their charge, and have invariably helped me in every way. I am indebted to them and also to the Matron and Nursing Staff, who have given me every possible assistance.

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The Modern Scope and Technique of Myomectomy.[1]

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The fact that fibroids are enucleatable tumours has been known ever since surgery applied itself to the uterus. In the early days of ovariotomy it sometimes happened that the surgeon exposed a tumour which was not a cyst but a fibroid, but so pedunculated that it could be treated in the same manner as a cyst, and from that to dealing with fibroids with broad pedicles and so to fibroids more or less embedded in the substance of the uterus were steps of natural sequence.

By the late '80's and the early '90's the operation of abdominal enucleation of fibroids had been taken up by certain surgeons, notably by Martin, of Berlin, and also by some British operators, but the mortality proved so high that by 1898 the operation had very nearly been abandoned, except in special cases, even by a man as brilliant and bold as Lawson Tait. The stumbling-blocks to success were difficulty in controlling the hæmorrhage and the liability to sepsis in the operation area. Moreover, it was at this time that the excellent results and still better prospects of hysterectomy, with intra-peritoneal treatment of the stump, were commencing to blaze up above the surgical horizon. In April 1898, however, Alexander, of Liverpool, the originator of the round ligament operation that bears his name, read a very remarkable paper at the Liverpool Medical Society, wherein he described a method of enucleating fibroids, the leading features of which were median laparotomy, a single anterior incision in the front of the uterus, packing of the cavity left after the enucleation with iodoform gauze, and ventral fixation. He cited six cases in which he had done this, the number of fibroids removed in the different cases ranging from one to as many as 25. The paper was reported in the *Medical Press and Circular*, and a perusal of the discussion which followed it shows it was not received with favour by the northern gynæcologists. Later in the same year he read a similar paper at a meeting of the British Gynæcological Society in London. He was then able to report 11 operations, with one death—a mortality of

1. Read at the Obstetrical Section Royal Society of Medicine.

9 per cent., which was not high, considering the high mortality of hysterectomy (from 12 per cent. to 30 per cent.) that then obtained. It is a remarkable paper even after the lapse of 24 years, and one sees clearly that here was a man possessed of the larger vision, who lived in advance of his time. The arguments he used in favour of conserving the uterus are as cogent to-day as then, while the operative technique of his procedure leaves not a great deal for the modern gynæcologist to improve upon. The paper was followed by a full-dress discussion, the reading of which is pathetic. One by one the gynæcological high priests of that day got up and figuratively stamped on him. Some had not grasped the fundamental idea of the operation, others criticized the mortality, others thought that a uterus from which many fibroids had been taken could be of no service even if the patient survived the operation, and some crushed him by citing adverse views of German authorities, a very good way at that time of demolishing one's opponent, as it always carried great weight, being considered to be a mark of erudition and professional capacity.

The outcome of that meeting was the figurative burial of myomectomy as far as being considered a classical operation was concerned. I do not know if Alexander subsequently continued to perform myomectomy or wrote any further paper on the subject; if he did I have not come across it, but I do know that the idea was so effectively killed that, although I went into gynæcology very shortly afterwards, I never heard his paper discussed, I never saw a reference to it, and I never saw anybody attempt to put his operation to the test of actual practice. And it is a fact that from then till now, considering the time—24 years—there have been extraordinarily few communications on the subject of myomectomy.

Arthur Giles read a paper in 1900 describing the removal through the abdomen of a submucous fibroid from a young woman, and suggested that in such cases the proper course was to preserve the uterus. Lockyer and Sampson Handley in 1903 reported a similar case, and various isolated cases of enucleation have been reported since then. Tuffier practised the operation in Paris and his cases were reported by Loubet in 1902. Tuffier, like Alexander, laid stress on the single incision on the front of the uterus, and had removed as many as 17 tumours at one operation, but his mortality was pretty high: he had four deaths in 30 cases. W. Mayo, in 1911, also wrote a paper on the myomectomies performed at the Mayo Clinic, 157 in number, with one death, but as they had done a very large number of hysterectomies during the same time it is obvious that the cases were selected, and whether they extended the operation to cases having many fibroids in the uterus is not recorded. Excepting for these papers there have been no reports

of work done in myomectomy that I can find from Alexander's time till now. Meantime the practice of hysterectomy has pursued its triumphant course, with a constantly improving technique, a steadily falling mortality, an increasing frequency of performance, and a very voluminous literature, which have their reflex in the popular idea—the layman's idea—that the possessor of fibroids must have her womb removed.

I feel very strongly against the removal of a woman's womb, and there are many reasons why we should prefer myomectomy unless there are imperative reasons for removing the uterus. Considering first the psychological aspect of the matter, there is no doubt that a woman of nice feelings does not like the idea of having her womb removed, and it is especially disliked by women who have not had any children. Comparing women who have fibroids, most of whom have had no children, with women suffering from uterine fibrosis, most of whom have had many of them, one finds that, as a rule, whereas the woman with fibrosis does not regret parting with her uterus, the woman with a fibroid does regret it. I take it that a woman who has had children feels that at any rate she has at least justified her existence on this earth, whereas the woman who has not had children may be without that consolation. Certainly it is the sterile woman who most resents the idea of having her uterus removed.

Many women object to hysterectomy because they think it will upset them from the sexual point of view, and there is no doubt that this is sometimes so. Sexuality is a very curious and complicated thing, and in some women it centres round the idea of procreation, and not merely round the idea of conjugation, and in a woman of that type, when she knows that pregnancy is no longer possible, the mainspring of the mechanism is lost. Again, many women think that if they have the uterus removed it necessarily means removal of the ovaries, and they have some reason for this, for it is a sorry fact that there are certain gynæcologists who, apparently, very frequently remove both ovaries with the uterus. Again, many patients think that the womb means the vagina, and that after hysterectomy they can no longer have relations with their husbands. It is all very well to say that this is mere ignorance and that the woman can be told that the operation does not prevent married life, and that it has no effect on the nervous system, but I doubt if all the teaching and all the preaching in the world will much alter traditional feminine opinion.

Some wives think that after removal of the womb their husbands will no longer be as fond of them, because they will not be whole, and there is some reason in this view. Sexuality in men is just as quaint and complex and variable as it is in women, and there are

some natures to whom the idea that their partner is not whole is repulsive.

The next point is the possibility of child-bearing. So long as a woman is under 43, there is the possibility of pregnancy if the uterus is conserved and the tubes and ovaries are healthy, and there is no doubt about it that pregnancy can occur safely and end happily after the enucleation of many fibroids from the uterus. One criticism advanced against Alexander was that the uterus could be of no possible use afterwards; but Giles has recently shown, from an exhaustive examination of his own figures, that out of 30 women under 45 years of age on whom he had performed myomectomy 14, or 28 per cent., subsequently conceived.

Lastly, among the reasons for saving the uterus, we have the probability that the uterus has an influence on the ovaries. From experimental work on animals—usually rabbits are chosen for it—it has been inferred that removal of the uterus does not influence the ovaries; but rabbits have no "change of life" or climacteric—they go on having little rabbits up to the time they die. A good many observers have stated that in women climacteric symptoms are undoubtedly hastened by removal of the uterus. My colleague Giles, who carefully studied the after-histories of all his cases of hysterectomy, stated that if you remove the uterus of a woman under 40 years of age, the symptoms of the climacteric, the distress and the flushings usually come on a year or two sooner than they normally would have occurred had the uterus not been removed. I have not followed my own cases in that thorough way, but I think that he is right, and that removal of the uterus does hasten the advent of the climacteric by two or three years.

Record of 100 Cases.

I here record a series of 100 consecutive myomectomies I have performed to show that within wide limits neither the number or position of the tumours in the uterus, nor the presence of degeneration, nor the accompaniment of menorrhagia or pregnancy, are a bar to successful performance of the operation.

Number of Tumours.

I have analyzed the 100 operations according to the number of tumours removed at each operation; the figures are as follows (O = Operation; F = Fibroids removed):—

O.	F.		O.	F.		O.	F.		O.	F.
1	30	...	4	14	...	4	8	...	5	4
1	21	...	1	11	...	2	7	...	10	3
1	17	...	2	10	...	2	6	...	10	2
1	15	...	1	9	...	6	5	...	49	1

In counting the number of fibroids removed at each operation I have included those of every size down to those as small as a mustard seed—not with a view to magnifying the achievement, but because the removal of these small tumours, as well as the large ones, is the essence of the success of the operation; moreover, the removal of the seedlings is often much more difficult than the removal of the large tumours. One is only able to feel such small masses because the surrounding muscular capsule makes them much larger to the touch than they prove to be after enucleation. The largest number of fibroids that I have removed from a single case is 30, but I do not regard this figure as necessarily the limit. Of course, one occasionally meets with cases in which a very large number are contained in the uterus; Bland-Sutton recorded years ago one in which over 100 were present, and in such their removal without the uterus would be impossible, but I should certainly say that, given a suitable case, more than 30 could be successfuly enucleated. It might be thought that after the removal of so many fibroids the uterus would be so hacked about as not to be worth conserving, but this is not so, as I shall proceed to show.

Position of Tumours.

The question of whether the tumour is sub-peritoneal, interstitial, or submucous is of little moment, but a sessile sub-peritoneal tumour, especially when large and of the superficial plaque variety, leaves a shallow bed not always easy to close satisfactorily. A submucous tumour usually means making a hole in the endometrium stretched over it, but this is not a serious matter. With an interstitial tumour, on the other hand, tearing of the endometrium should not occur, while the closing of the cavity is rendered easy by the thickness of the tissue that surrounds it. The position of the fibroid relative to the uterus as a whole is much more important. In the first place, anterior tumours are much more favourably placed than fundal tumours, and still more than posterior tumours, because they only involve making a straightforward anterior incision—the ideal position, for reasons I will refer to later. Fundal or posterior tumours, though in some cases they can be easily extracted through an anterior incision, require in other cases much more skill in order to avoid a stitched wound or stitch-holes on the posterior peritoneal surface of the uterus; sometimes, indeed, it is impossible to avoid them. Tumours growing laterally have the disadvantage that to get them out the uterine artery may need to be divided, but tumours growing in the broad ligament are enucleated easily. The least advantageously-placed tumours are those growing in the cervical portion of the uterus, because the elongation of the cervix they produce is difficult to deal with after removal of the

tumour. A posterior cervical fibroid of considerable size, fairly imbedded—especially if the capsule is very vascular—is the most difficult problem of all.

Degeneration.

Malignant degeneration and necrosis or suppuration due to sepsis are conditions which, of course, bar the operation, but, with one other exception, the fact that a fibroid is undergoing degeneration does not affect the question of its removal without the uterus. I have at various times enucleated fibroids undergoing "red," pseudo-mucinous, cystic, or calcareous degeneration. The most interest attaches to "red" degeneration, which has been considered by some as an infective condition on account of the pain and fever to which it often gives rise. I have enucleated red degenerate fibroids on six occasions; in each case the typical symptoms were present, and in five of them the symptoms supervened suddenly in association with pregnancy. All the patients recovered uneventfully after operation—which proves, I think, that in this form of degeneration the fever is due to absorption of a toxin formed, not by bacterial action, but by the breaking-down tissue. The remaining exception is nævoid degeneration, in which a number of blood spaces are formed in the substance of the fibroid, whilst the capsule surrounding it is intensely vascularized, like the uterine wall in the region of the placental site, and the main vascular leashes of the uterus are immensely enlarged, especially the veins. The enucleation of such tumours—especially when they are large—is accompanied by such excessive bleeding that the operation at all times requires great consideration, and should certainly not be attempted when the fibroid is unfavourably placed.

Pregnancy.

Pedunculated fibroids, or fibroids superficially situated on the anterior wall of the uterus, and fibroids in the broad ligament, can be removed without great risk of disturbing a pregnancy, but the more deeply imbedded they are the greater is the risk of provoking uterine contractions; while to be able to carry out multiple myomectomy in the pregnant uterus with reasonable hope of saving the pregnancy is rare. Moreover, if deep enucleation is performed whilst the pregnancy is still *in situ* the bleeding from the cavity left is profuse and difficult to control, because the pregnancy prevents the uterine tissue retracting, and the passage of sutures sufficiently deep to approximate the walls of the cavity may be impossible, short of passing them through the whole thickness of the uterine wall and disturbing the pregnancy. On the other hand, the recently delivered uterus is peculiarly favourable for enucleation, because of the retractile state of the musculature.

The proper course, therefore, in these cases of deeply-seated tumours—as also in most of the cases of multiple tumours—is to treat the pregnancy as an additional tumour, remove it by Cæsarean section, and then utilize the uterine incision to remove the fibroids, or as many as possible, through it. For even if the child be not viable, it is better to ensure a good recovery from the operation, so that the patient may be placed in the best possible state for future pregnancy, than to take the risk of post-operative hæmorrhage or post-operative miscarriage, either of which may endanger smooth convalescence and leave the parts in a state in which future pregnancy is unlikely or impossible. In my series of cases 11 of the patients were pregnant, and in five of these the removal of fibroids, totalling 14, five, five, five, and one, was preceded by the removal of a living viable child, whilst of the remainder five had removed, respectively, 30 fibroids and a three months' pregnancy, 21 fibroids and a three months' pregnancy, 14 fibroids and a three months' pregnancy, 10 fibroids and a four months' pregnancy, and one fibroid and a two months' pregnancy, and one had three fibroids removed and the pregnancy successfully left *in situ*.

Accompanying Menorrhagia.

Patients suffering from profound anæmia due to fibroids should not be treated by myomectomy, because in them the continuance of even normal periods is undesirable, so much is their blood content depleted and their blood-forming mechanism enfeebled. Moderate menorrhagic anæmia, however, does not contra-indicate myomectomy, provided the operation is carried out so that all the tumours are removed and that the uterus left behind is not too big for the involution that occurs after myomectomy (as after childbirth) to restore it to normality. One of the risks urged against myomectomy is that of menorrhagia continuing after the operation, but when this occurs I believe it is nearly always due to the surgeon's failure to achieve these two desiderata; for though a diffuse fibrotic state of the uterine musculature may co-exist with fibroids, experience shows it to be rare; on the contrary, the uterine muscle is nearly always conspicuously healthy and well-developed. This is probably partly owing to the fact that patients with fibroids have had few, and oftener no children, and that many of them are unmarried, so that they have commonly escaped the factors making for fibrotic degeneration; but beyond this I think that fibroids, like pregnancy, stimulate the growth of new and healthy muscle in the uterine wall.

In all cases of fibroids with menorrhagia in which myomectomy is performed the uterine cavity should be opened in order to make certain that no small fibroid on the mucous surface, or mucous

polypus, or great thickening of the endometrium is missed. Mucous polypi are very common with fibroids, and owing to their soft consistence they cannot be palpated through the uterine wall as a fibroid can, whilst a thickened endometrium must be seen to be discovered. For the scraping away of thickened endometrium through an incision in the uterine wall I have found the steel "finger nail" formerly used for the removal of adenoids very efficacious.

Results of Operation.

Risk.

I had two deaths in my series, a mortality of 2 per cent. The mortality rate of hysterectomy for fibroids at Chelsea Hospital for Women for the years 1905—1918 inclusive was 1.5 per cent., whilst many individual accomplishments of 100 hysterectomies without a death are on record. In comparing the risks of the two operations, however, I should like to emphasize that neither of the deaths in my series ought to have occurred. The first patient was a woman little over 30 years of age, who had a single anterior interstitial fibroid which enlarged the uterus to the size of a seven months' pregnancy. I enucleated it through an anterior incision, cut away the excess of uterine tissue which covered it, and sutured and ventrally fixed the uterus without incident, except that the capsule was very vascular. I was called to see her five days later, on account of symptoms of intestinal obstruction, the patient being very ill. On re-opening the abdomen I found it full of blood which had leaked from one of the suture holes of a main mattress suture. Death in this case was due to the overlooking of a hæmorrhage too slow to present the ordinary symptoms of internal bleeding. Had it been recognized and dealt with in time the patient would not have died. The second patient also had a very large interstitial fibroid, together with a two months' gestation, the combined mass being as large as an eight months' pregnancy. The fibroid was nævoid, and unfortunately I did not temporarily clamp both uterine arteries as well as both ovarian arteries, as I should do now. The result was excessive bleeding, which hurried me whilst removing the pregnancy and fibroid. The uterine wall after the enucleation was very redundant, and I did not cut it sufficiently freely away, so that the suturing took much longer than it should have done; when I had finished it I still had an organ much too big—which, however, I returned to the abdomen, as the patient by this time had a very rapid pulse-rate. She died of shock. I record these two mistakes to help those who may have to deal with similar cases.

The chief risk of an extensive myomectomy is hæmorrhage during and after the operation. It can be guarded against by temporarily securing the main vessels going to the uterus; by

properly placing the sutures, and by cutting away sufficient tissue to leave an organ of manageable size to suture up. It must also be borne in mind that when hæmorrhage does occur after the operation it is in the nature of a slow dribble or ooze which produces not the classical symptoms of internal hæmorrhage but rather those of peritonitis or intestinal obstruction. Had I again to perform these two operations, knowing what I now know by unfortunate experience, the results would be different.

Ultimate Results.

I have not investigated the after-history of my cases of myomectomy with the thoroughness with which my colleague, Arthur Giles, has followed up the after-histories of his, but I have been in touch with most of the patients, either directly or through their medical men, and I have not had one bad report. In no case that I know of have further fibroids appeared, nor have any of the patients been sent back to me on account of continuance or reappearance of menorrhagia. It may be suggested that such happenings have occurred, but that the patients, disgusted at not being cured, have gone elsewhere. I do not think so, because a large proportion of the patients in this series were cases operated on privately, mostly for old clients of mine from whom I should have heard quickly enough about my failures; on the contrary, the reports have been uniformly satisfactory, and broadly comparing the outcome of my myomectomies with the outcome of hysterectomies as far as either have been brought to my notice, I affirm that the former operation has been at least as satisfactory as the latter. On three occasions I have had the opportunity of viewing through an abdominal incision a uterus from which I had removed multiple fibroids some years previously. In one case I had removed seven fibroids, and in the other two five fibroids each, and in all the uterus appeared normal.

As regards pregnancy, five patients to my knowledge have had, and others may have had, a child since the operation. Of these, one had 14, another eight, and another five fibroids removed, and two had one fibroid each removed. All had successful deliveries by the normal passage except the patient with five fibroids, and her I delivered by Cæsarean section, partly at her own desire and partly (it was one of my early cases) because I was not certain how the uterine scar would stand the strain of labour. I found, however, that the uterus was normal, nor could I see a trace of my former operation, and there is no doubt she could have delivered herself.

Technique of the Operation.

In myomectomy asepsis is very important, especially when many tumours have to be removed, for in such cases the collective

area of the cavities left by the enucleation amounts to that of a large wound and the quantity of suture material is considerable. The uterus delivered through the abdominal wound should therefore be protected from contact with the skin by rubber sheeting and towels, and the vagina should be sterilized as far as possible by a strong antiseptic. I use violet green for this. For suture material I use both silk and catgut, silk for the deep mattress sutures, taking much tension, and catgut for the superficial sutures.

Hæmostasis is as important as asepsis in these operations, and it is essential to see that the incision or incisions in the uterus are well closed. The method I commonly employ is the same as that I use for Cæsarean section; a layer of deep mattress sutures of silk, a superficial continuous suture of catgut, and between them often, but not always, a layer of interrupted or continuous catgut mattress suturing. A well sewn-up uterine incision should show a slight degree of blanching of the tissues superficial to the deep mattress suture.

Incision.

As regards the position of the incision in the uterus, Alexander enunciated the correct principle 24 years ago—*i.e.*, a single anterior incision and extraction of all the tumours through that one incision. An anterior incision has these great advantages: if post-operative bleeding occurs the blood accumulates in the utero-vesical space, and intestine is least likely to adhere in consequence of it; if the operator doubts that the incision is blood-tight he can suture it to the anterior abdominal wall or the back of the bladder and render it safe. The advantages of a single incision are manifest; it reduces the area of possible blood leakage and intestinal adhesion to a minimum, and these are the two principal risks to be guarded against. When Alexander stated that it was possible to remove many tumours through a single anterior incision, even if some of them were situated in the posterior wall, his assertion was received with scepticism, but it is quite true as a rule.

The fibroid most easily accessible through an anterior incision should be first attacked, and the incision should be carried right into the substance of the tumour so that there is no difficulty in finding the plane of cleavage between tumour and capsule. The fibroid having been enucleated the next most accessible should be reached by a secondary incision starting in the wall of the cavity left by the first tumour (figs. 1 and 2.) The scalpel should be boldly thrust down to the tumour and the finger should then be thrust down the same track till the fibroid is reached, when the plane of cleavage can be sought for. Very often the tumour can be entirely freed before a volsellum is passed down to pull it out (figs. 3 and 4).

Fibroids are often quite movable in the uterine wall, and can be manipulated by the fingers of the left hand to a position convenient for making a track down to them. In this way tumours of the posterior wall can be reached by a track which skirts round the uterine cavity but does not open it (fig. 4). It might be thought that serious bleeding would often occur from the walls of these tracks, but it does not, unless in the making of a very lateral track the uterine artery be wounded. In such an event the bleeding can quite easily be controlled by putting a couple of ligatures round the artery above and below the track in the same manner as the artery can be ligatured before the amputation in hysterectomy.

Some posterior fibroids are best got out through the cavity of the uterus (fig 5). There is no objection to opening the cavity of the uterus; indeed, as I have stated, it should always be done when menorrhagia is a symptom. It is most important to search the uterus thoroughly so as to be sure at the conclusion of the operation that no fibroids have been missed. The organ should be palpated very carefully between the finger and thumb, one of which should be inserted into the enucleation cavity, or into the uterine cavity if this has been opened, so as to reduce the thickness of tissue palpated. As I have said, fibroids as small as a mustard seed can easily be felt, on account of the apparent enlargement that the capsule produces. It may be argued that, even if all the fibroids be removed, there is nothing to prevent fresh ones being formed. The possibility cannot be denied, but in practice it does not occur, and my experience leads me to believe that as a rule the seeds of all the fibroids a woman is going to have are formed by the time she is 35 years of age.

Suture.

Not the least interesting part of myomectomy is that the suturing of the enucleation-cavities exercises the ingenuity of the surgeon. When all the cavities are in the anterior wall the standard arrangement of mattress and superficial sutures, as for closing a Cæsarean incision (figs. 6 and 7), can usually be made to fulfil the purpose, though even here there are exceptions (fig. 8). When, however, a posterior tumour has been removed through an anterior incision the mattress suture may be inserted from the back of the uterus, guided by a finger passed into the cavity through the anterior incision (fig. 9). This is not quite so satisfactory as sutures passed anteriorly, because the suture holes lie, and the sutures are tied, on the back of the uterus (fig. 10). In cases in which the cavity to be closed, though posterior, lies laterally, the sutures may be passed from before backwards outside the cavity of the uterus and tied on the side of the uterus, constricting the uterine artery with no disadvantage. When a posterior tumour

has been removed " transcavity " the sutures can be passed from the uterine cavity, but in this case catgut should be used and not silk, as the knots will lie in the uterine cavity (fig. 11).

After the enucleation of a tumour which approaches the peritoneal surface the wall of the cavity left may be very thin at the pole where the tumour approached the peritoneum (fig. 12). In this event the thin wall should be invaginated by a circular purse-string suture or several rows of such sutures, and posterior mattress sutures may be inserted in addition if this appears necessary (figs. 13 and 14). A common position for fibroids to occupy is the fundus or the posterior wall just below the fundus, and they should be dealt with in the following way: A transverse incision is made in the anterior wall high up, opening or not opening the uterine cavity, as the operator thinks fit. A secondary track down to the fibroid is then made in the plane of the peritoneal surface of the fundus (fig. 15), and this having been enlarged by the finger, the tumour is enucleated (fig. 16). It will now be found possible to pull that part of the uterine wall that covered the tumour over the top of the uterus like a monk's hood and fix it by a series of mattress sutures so that the line of the incision now lies transversely across the anterior wall, much lower down than the original incision (figs. 17 and 18). All posterior fibroids cannot be got out through an anterior incision, and even with some capable of being so removed the posterior wall may be torn in the process, in which event the hole should be closed by a purse-string suture. Some posterior fibroids are too large or too closely blended with the peritoneum to be enucleated from in front; in such cases the surgeon has no choice but to incise the posterior wall. It will then probably be necessary to reinforce or cover the suture line by one of the artifices presently described.

Redundant Tissue.

One of the greatest difficulties in myomectomy is the fact that with large submucous or interstitial tumours the uterus is so hypertrophied over the tumour that an immense organ is left after the tumour is removed; indeed, when the tumours are multiple, and this hypertrophy very marked, the case may be unsuitable for the operation altogether. The uterus involutes after the removal of a fibroid, as after labour, but to return to the abdomen an enormously bulky organ is to invite hæmorrhage or intestinal obstruction. In such cases, therefore, the excess of uterine tissue should be cut away, and I find that the tendency is not to do this boldly enough. The cut edges should be " bevelled " inwards to facilitate apposition in suturing.

I have spoken of the advantage of being able to fasten the wound in the uterus to the abdominal wall, and I often conclude

the operation in that way, never myself having seen any serious ill-results from ventral fixation, but there are other things one can do to guard against post-operative oozing. Thus the round ligaments can be shortened so as very fully to antevert the uterus against the bladder, or the septum method of ventral suspension, so popular in Liverpool, may be employed.

Occasionally one is obliged to prolong an anterior incision over the fundus and down the back wall, and in such cases I modify ventral fixation in this way. The front of the uterus it attached to the aponeurosis and peritoneum of the abdominal wall by silk sutures in the usual way; then above this area of fixation the parietal peritoneum alone is attached to that part of the uterine incision that extends down the posterior wall by a continuous catgut suture, the peritoneum being displaced from off the abdominal wall to allow of its coming down to the uterus. By this means I avoid the danger of posterior fixation, an operation which very rightly has been abandoned as dangerous. Incisions low down on the posterior wall cannot be so treated, but if laterally placed the ovary or the posterior part of the broad ligament can be swung inwards and sutured to cover them. If this cannot be done a very good plan is deliberately to attach the front of the pelvic colon to the line of the incision by catgut sutures, taking care that the bowel runs down to the rectum without a kink. A planned adhesion of the colon does not matter, but a chance adhesion of a coil of ileum is quite another matter.

Hæmorrhage.

Finally, in the matter of hæmorrhage during operation I nearly always begin by putting a ring forceps on the ovario-pelvic ligament on each side so as to control the ovarian vessels. If the operation is likely to prove a difficult one, or if there is great vascularity, I also temporarily clamp the uterine artery on both sides. This is conveniently done by passing one blade of the forceps through a hole in the mesosalpinx so as to avoid injuring the tube. In difficult cases, however, it is best to divide the round ligaments, turn back the peritoneum, and deliberately seek for and ligature the uterine vessels before beginning the enucleation; indeed, all four main vessels of the uterus may be safely ligatured without the slightest fear of gangrene.

These are the main points in the technique of the operation as I have performed it—no doubt many here have practised the same artifices and devised others which have not occured to me. Myomectomy is essentially an operation which calls for ingenuity. Many of us, I know, have been unofficially (if I may use the term) extending the scope of myomectomy for some years past. The time is ripe for official recognition of that extended scope. There

has been too much hysterectomy, and the public has come to believe that if a woman has a fibroid surgical opinion is in favour of doing what in vulgar parlance is called "taking all her inside out"; hence the retrograde revival of oöphorectomy for fibroids—"bloodless" oöphorectomy by X-rays, but oöphorectomy just the same. I hope that in future it will be common knowledge that fibroids do not as a rule necessitate hysterectomy, and that if the possessors of fibroids will only submit themselves to early surgical treatment the womb need never be removed.

Description of Figures.

Fig. 1. Diagrammatic cross-section of a uterus containing three fibroids. A=anterior surface; P=posterior surface.

Fig. 2. The anterior fibroid has been enucleated through an anterior incision and the lateral fibroid is being enucleated through a secondary incision.

Fig. 3. The posterior fibroid is being attacked, the scalpel being passed down to it through the cavities left by the two previous enucleations. The index finger of the operator's left hand is pushing the fibroid laterally to make it more accessible.

Fig. 4. The posterior fibroid is being pulled out by a volsellum. The operator's left index finger is assisting the manœuvre by pushing it in the desired direction.

Fig. 5. A posterior fibroid being enucleated "transcavity."

Fig. 6. The standard arrangement of sutures for the anterior incision.

Fig. 7. A lateral enucleation-cavity being included in a standard mattrass suture.

Fig. 8. A lateral enucleation-cavity with a mattrass suture closing it passed from an anterior enucleation cavity.

Fig. 9. A posterior enucleation-cavity closed by mattrass sutures passed from the back of the uterus.

Fig. 10. The posterior mattrass sutures tied and throwing up a ridge on the back of the uterus.

Fig. 11. A posterior enucleation-cavity closed by catgut sutures passed from and tied in the cavity of the uterus.

Fig. 12. A posterior enucleation-cavity closely approaching the peritoneal surface.

Fig. 13. A purse-string suture inserted to invaginate the thin tissue that separates a posterior enucleation-cavity from the abdominal cavity.

Fig. 14. A posterior enucleation-cavity invaginated by a purse-string suture and additionally closed by mattrass sutures inserted posteriorly.

Fig. 15. A fibroid in the upper part of the posterior wall of the uterus reached by a secondary incision starting from a primary transverse incision on the front of the uterus.

Fig. 16. The loose "hood" of uterine tissue left after the enucleation. The letters mark the points to be brought into apposition by mattrass sutures passed from A, B and C on the front of the uterus to A, B and C on the "hood."

Fig. 17. The "hood" pulled forwards.

Fig. 18. The "hood" sutured by mattrass sutures A, A, A, and B, B, B, and a continuous suture C, C, C.

Fig. 1.

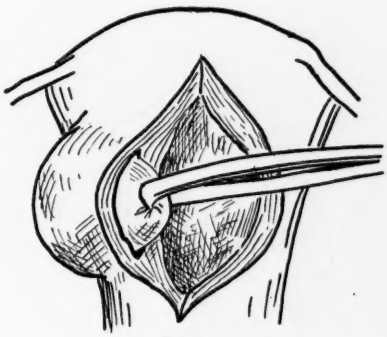

Fig. 2.

Fig. 3.

Fig. 4.

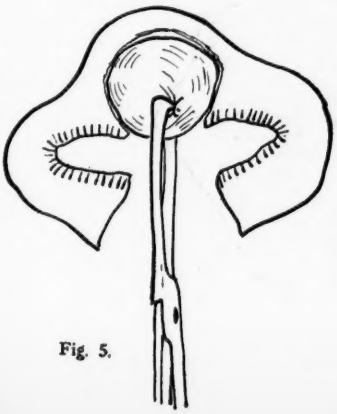

Fig. 5.

Fig. 6.

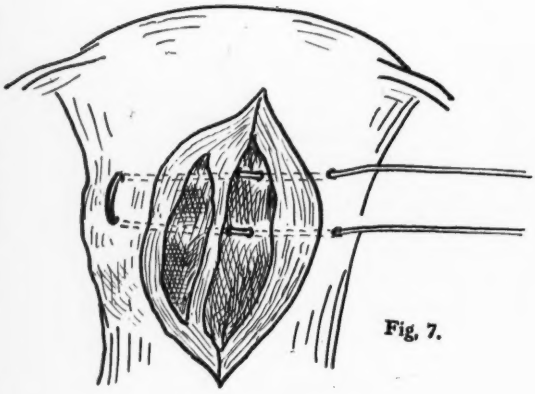

Fig. 7.

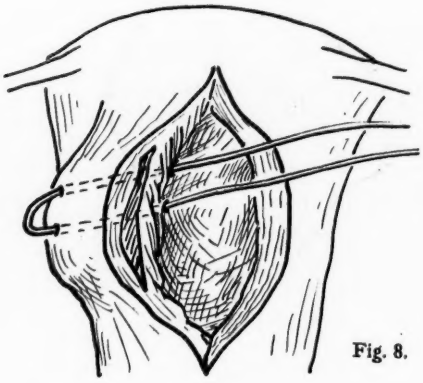

Fig. 8.

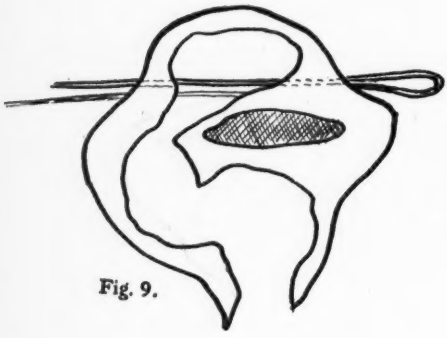

Fig. 9.

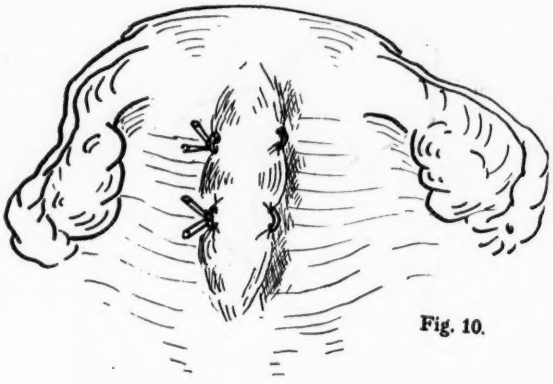

Fig. 10.

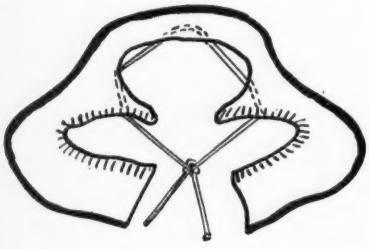

Fig. 11.

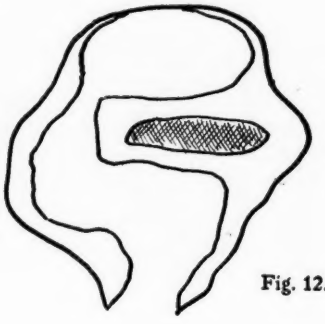

Fig. 12.

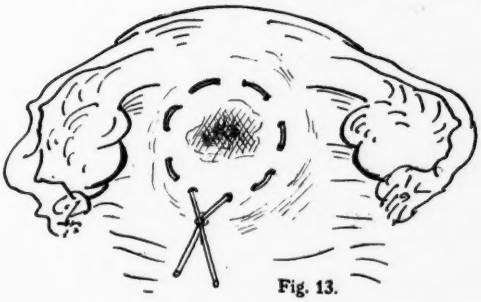

Fig. 13.

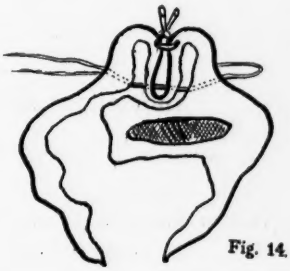

Fig. 14.

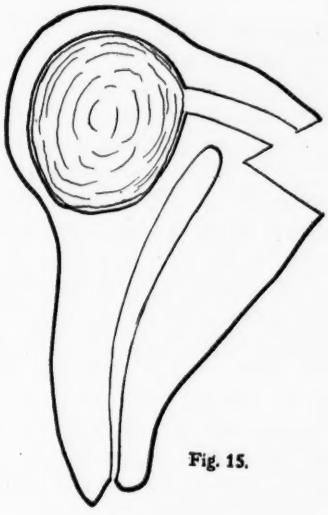

Fig. 15.

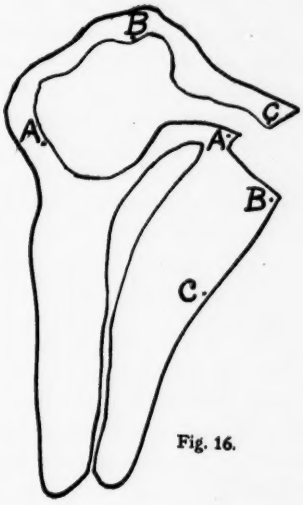

Fig. 16.

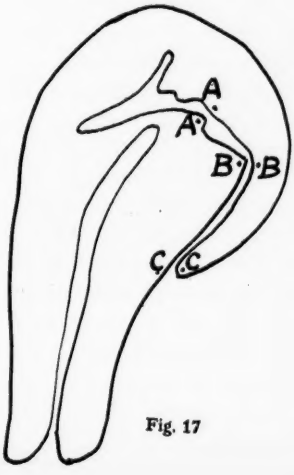

Fig. 17

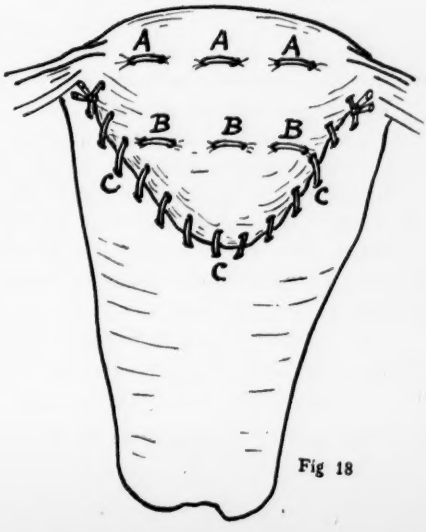

Fig 18

Indications for and Results of Myomectomy.[1]

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In recent discussions on the treatment of uterine fibroids, the alternatives of hysterectomy on the one hand and X-ray and radium treatment on the other have generally been dealt with as though they exhausted the possibilities of treatment. Myomectomy has been almost entirely overlooked. At the meeting of this section in April last a paper was read by Fletcher Shaw on the X-ray treatment of fibroids, as a sequel to a former paper by Eden and Provis. I then felt that the case for myomectomy might well be presented, and this contribution is the result.

I hold the view that in the majority of cases of fibroids requiring surgical treatment hysterectomy is the more suitable and also the more satisfactory operation and that the scope of myomectomy is restricted to the minority of cases. Hysterectomy requires no justification: it is generally accepted as a sound procedure, surgically and clinically. But myomectomy needs to justify itself by its results and to provide reasons why it should be preferred: it must also acknowledge its limitations and define the conditions of its suitability.

The outstanding claims for myomectomy are first that the uterus is preserved for the important function of childbearing; and secondly that the patient is thereby spared the mental distress of feeling that an essential part of her womanhood has gone.

The broad-minded advocate of myomectomy will, I think, at once concede that in a woman who is past the child-bearing age the first claim disappears and the second has only an academic existence; although, as I shall point out, there may be reasons for preserving the uterus that are not founded on its child-bearing function. But we may properly narrow the issue to the consideration of myomectomy *versus* hysterectomy in the child-bearing period.

The advocate of myomectomy is then, I think, called upon to show in the first place that the preserved uterus is in fact, as well as in theory, capable of child-bearing; and in the second place, that

1. Read at the Obstetrical Section Royal Society of Medicine.

there is a reasonable prospect of a cure, both anatomically and symptomatically; in other words, that in a large majority of cases there will be no return of fibroids, and that the patients will menstruate normally.

The case for myomectomy will be best presented if we begin by examining the question whether it is justified by its results; and if the answer proves to be in the affirmative, we can then consider the scope and limitations of the operation.

A separate short section will be devoted to the interesting subject of myomectomy during pregnancy.

Results of Myomectomy.

We may glance first at the immediate results, namely, the mortality, as compared with hysterectomy; for this purpose my own statistics will serve as well as any. The figures up to date are as follows:—Hysterectomy for fibroids: 987 cases, 17 deaths: mortality, 1.72 per cent.; myomectomy: 167 cases, 3 deaths, mortality, 1.8 per cent.

The above figures represent all cases from 1897. The present day mortality is lower, and the figures from the end of 1910 to date are as follows:—Hysterectomy: 684 cases, 5 deaths; mortality 0.72 per cent.; myomectomy: 107 cases, 1 death: mortality 0.93 per cent.

There is thus very little difference in the mortality of the two operations; certainly not enough to make this a deciding factor in the choice of operation.

Later Results.

In my work on the "After-results of Abdominal Operations" published in 1910, I was able to give particulars of 40 cases traced out of 51 operated upon. Of the later 116 cases I have particulars of 53. I did not attempt to trace the histories of patients who were over 45 years of age at the time of operation.

I will take in order the three questions investigated in the previous cases.

I.—*What is the likelihood of a recurrence of fibroids?*

In the first series, of 39 cases examined, the uterus was found of normal size with no return of fibroids, in 35 cases, or 90 per cent.

In the present series, of 49 cases examined, or reported upon by their doctors, the uterus was normal in size without fibroids, in 41 cases; it was enlarged, without fibroids, in three cases; in all, 44 cases without fibroids, or 90 per cent. as in the first series. In five cases fibroids were observed, the notes about them being:—

1. Fibroid in fundus: hysterectomy advised on account of bleeding.

2. Fibroid, size of pea, on posterior wall.
3. Multiple fibroids, hysterectomy performed nine years after myomectomy.
4. Fibroid, size of mulberry, on the anterior wall.
5. Fibroid, size of pea, on anterior wall.

The conclusion is that the liability to return of fibroids may be represented as 10 per cent.

II.—*How is the menstrual loss affected?*

In the first series the menopause had occurred before the operation in three cases, and in one case there was no further loss after operation. Of the remaining 36 cases, menstruation was normal or moderate in 31, or 84.5 per cent., and free or profuse in five, or 15.5 per cent.

In the present series we can exclude six cases in which the menopause preceded or synchronised with the operation. Of the remaining 47 cases menstruation was normal and moderate in 36, or 75.1 per cent.; and in 11 cases it was profuse, either at first or later on; or there was intermenstrual loss. Taking all the cases together, we find that of 83 cases, menstruation was normal in 67, or 80.7 per cent.

The conclusion is that there is a liability to menorrhagia or metrorrhagia after myomectomy in about 20 per cent. of cases.

This result is not altogether surprising; because it is clear that unless we open the uterine cavity every time we do a myomectomy, some small intra-uterine growth may easily be overlooked.

In order to show that sufficient time had elapsed to judge of results, I may mention that the time between the operation and the report on the cases in the present series was as follows:—

1 to 2 years	4 cases	7 to 8 years	2 cases
2 „ 3 „	8 „	8 „ 9 „	6 „
3 „ 4 „	2 „	9 „ 10 „	7 „
4 „ 5 „	5 „	10 „ 11 „	3 „
5 „ 6 „	1 „	13 „	1 „
6 „ 7 „	12 „		

III.—*Is the uterus serviceable for child-bearing after myomectomy?*

In the first series there were 15 married women under 45 years of age: of these, one was four months pregnant at the time of operation, went to term, and became pregnant again; two others became pregnant after the operation.

In the present series I have after-histories of 38 married women under 45, including three who were single at the time and married afterwards.

I have drawn up a table of these cases. (Table I.)

TABLE I.

Results of myomectomy in relation to pregnancy.

No. in present series.	Age.	Date of Operation.	Pregnancies after operation.
2	38	Nov. 11, 1909.	None. Husband has been in an asylum all the time.
10	18 (single)	June 12, 1911.	Married since. Confinement, October, 1921.
13	30	March 14, 1912.	None.
14	39	April 15, 1912.	Pregnancy at operation went to term. None since.
19	33	June 30, 1912.	None.
23	30	Jan. 14, 1913.	None.
25	32	Jan. 30, 1913.	None.
26	35 (single)	Feb. 3, 1913.	Married in 1914. Confinements April, 1916, and March, 1919.
27	34	March 17, 1913.	Pregnancy at operation went to term. None since.
32	41	Sept. 25, 1913.	None.
33	31	Oct. 6, 1913.	Confinements January, 1915, April, 1917, March, 1919, August, 1922. Prior to operation had been married 6 years, without children.
34	37	Nov. 29, 1913.	None.
39	38	April 24, 1914.	None. Died in May, 1918.
44	34	June 8, 1914.	Confinement, October, 1917. None since.
45	34	July 9, 1914.	None.
46	29	Oct. 14, 1914.	Pregnancy at operation went to 7½ months. None since.
47	42	Oct. 22, 1914.	None.
49	30	Nov. 6th, 1914.	Confinement since, date unknown.
51	35	Dec. 2, 1914.	Confinement, June, 1916.
58	34	Oct. 7, 1915.	Pregnancy at operation went to term. Another confinement May, 1920.
59	35	Oct. 11, 1915.	Pregnancy at operation went to term. Another confinement January, 1919.
61	35	Nov. 11, 1915.	None.
62	32	Jan. 3, 1916.	None.
63	37	April 17, 1916.	Pregnancy at operation went to term. None since.
64	34	May 1, 1916.	None. Has not lived with her husband since operation.
69	37	Oct. 9, 1916.	Pregnancy at operation went to term. Patient died of eclampsia.
71	30	Jan. 11, 1917.	None. Premature menopause, April, 1921.
72	35	Jan. 22, 1917.	Confinement, February, 1918.
81	35	Nov. 26, 1917.	None.
82	33	Feb. 6, 1918.	None.
88	40	Dec. 30, 1918.	Pregnancy at operation went to term. None since.
92	36	Nov. 25, 1919.	Pregnancy at operation went to term. None since.
97	36	Feb. 5, 1920.	Pregnancy at operation went to term. None since.
98	31	March 18, 1920.	None.
100	31	April 14, 1920.	None.
103	28	June 28, 1920.	Married, June, 1922. Now 2½ months pregnant.
105	29	July 20, 1920.	Confinement, February, 1922.
106	38	July 21, 1920.	None.

One, who was pregnant at the time of operation, died of eclampsia at her confinement; and two did not live again with their husbands after operation. Of the remaining 35, 11 became pregnant after the operation, including two patients who were pregnant at the time, went to term, and became pregnant again. One patient had two children, and another had four.

In all, therefore, of 50 women who had the chance of conceiving after operation, 14 became pregnant, or 28 per cent.

Now the question that we have to decide is this: are the results of myomectomy good enough to justify us in practising this operation in suitable cases? My answer is an unqualified "Yes," on the ground that the advantages far outweigh the disadvantages.

The advantages are represented by the occurrence of pregnancy in 28 per cent. of the women who had a change of pregnancy, and by the satisfaction which patients derived from the consciousness that they remained after the operation "like other women." This satisfaction cannot be expressed in statistics, but it is nevertheless a very concrete advantage.

The disadvantages are the possibility of the return of fibroids which is a 10 per cent. chance; and the possibility of further menstrual trouble, which is a 20 per cent. chance. Some women doubtless would prefer the assurance, which hysterectomy gives, that there will be no return of their troubles, and that the operation is, therefore, final. But I am persuaded that the great majority of women would prefer to take the risk which the figures indicate, for the possible chance of having a baby. The risk of a second operation being necessary is not as great as 10 per cent.: hysterectomy has been required in only five cases out of the total 167, that is in just 3 per cent.

I submit, therefore, that, judged by the criterion of results, the advantages of myomectomy definitely outweigh its disadvantages in the surgical treatment of uterine fibroids, in a restricted class of cases. My own sense of this restriction is sufficiently expressed in the fact that of 1,154 cases of uterine fibroids treated surgically, hysterectomy was performed in 987, or 85.5 per cent. The proportion of myomectomy to hysterectomy was thus 1 to 6.

We may now examine the scope and limitations of myomectomy.

Indications for Myomectomy.

There is one important indication for myomectomy and there are several subsidiary ones. I will take the important one first.

1. *The fact that the patient is of child-bearing age.* The younger the patient the greater should be the effort to save the uterus, and I should say that, broadly speaking, myomectomy is the operation of choice in women up to the age of 40. In single

women the indication is not so great as it is in married women, especially after the age of 30; because after this age the expectation of child-bearing is necessarily less in the spinster from the fact that she has first to get married.

The generalisation of age in the case of married women may well be qualified by the question of previous pregnancies: when a woman has half-a-dozen children living and healthy we need not be so concerned to save the uterus as we should be in the case of a woman who has had no children and is ardently desirous of having one. This reflection is well illustrated in a case of myomectomy during pregnancy, to which I shall refer later.

The influence of age and of the married state upon my own practice is set forth in the following table (Table II), which shows the proportion of myomectomies to hysterectomies at different ages, in single women, in married women, and in the two groups taken together. In five-yearly periods the percentage of myomectomies, which stands at 56.6 for all cases under 30 in married women, progressively falls to 40.1, 26.7, 6.1 and 5.5, and rises a little to 10.0 in the case of women over 50. In single women the percentage is 45.0 for all cases under 30, and falls to 21.3, 8.3, 8.6, and 4.0, and rises to 10.0 in those over 50.

Taking all the cases together, the percentage is 52.0 in women under 30, and in successive five-yearly periods it is 34.3, 19.2, 6.9 and 5.1; and for women over 50, 10.0.

It will be noticed that the proportion of myomectomy is markedly higher in married women than in spinsters up to the age of 40, after which there is not much difference.

2. *Association of uterine fibroids with prolapse and procidentia.* The rise in percentage of myomectomies after the age of 50 is explained by the fact that a number of these patients had prolapse or procidentia. In the presence of this complication I consider that it is very important to preserve the uterus; because this can be fixed up to the abdominal wall when myomectomy has been done, and thus play an essential part in the cure of the displacement. When the uterus is removed in conditions of procidentia there is a marked tendency to prolapse of the vaginal walls which is apt to be very troublesome, and to defy, in severe cases, even extensive plastic operations on the vaginal walls and perineum.

3. *A deep-rooted objection on the patient's part to hysterectomy.* In my experience the great majority of women suffer no more than a passing regret for the loss of the uterus, especially when it is explained to them that the presence of the tumours has rendered it incapable of serving its one function, that of child-bearing; that the uterus is not the essential organ of sex, and that its removal has no effect on the specially feminine characteristics and does not render

TABLE II.

Showing the proportion of myomectomies to hysterectomies at different ages.

Age.	30 & under.		31—35		36—40		41—45		46—50		Over 50		Total	
Married Women.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Myomectomy	17	56.6	37	40.1	36	26.7	13	6.1	11	5.5	11	10.0	125	16.0
Hysterectomy	13	43.4	53	59.9	103	73.3	201	93.9	190	94.5	99	90.0	659	84.0
Total	30	100.0	90	100.0	139	100.0	214	100.0	201	100.0	110	100.0	784	100.0
Single Women—														
Myomectomy	9	45.0	10	21.3	7	8.3	8	8.6	3	4.0	4	10.0	41	11.4
Hysterectomy	11	55.0	37	78.7	78	91.7	85	91.4	72	96.0	36	90.0	319	88.6
Total	20	100.0	47	100.0	85	100.0	93	100.0	75	100.0	40	100.0	360	100.0
All Cases—														
Myomectomy	26	52.0	47	34.3	43	19.2	21	6.9	14	5.1	15	10.0	166	14.5
Hysterectomy	24	48.0	90	65.7	181	80.8	286	93.1	262	94.9	135	90.0	978	85.5
Total	50	100.0	137	100.0	224	100.0	307	100.0	276	100.0	150	100.0	1144	100.0

a woman any less able to live a married life. But there are a few women, swayed more by sentiment than by reason, to whom the loss of the womb seems a greater calamity than the loss of life itself: to them this organ appears to be the focus and essence of their personality as women, and if hysterectomy be performed, it is apt to be followed by a profound and lasting depression which approaches the border-line of mental instability. In dealing with a patient of this kind it is clear that a special effort should be made to save the uterus, even if the age of child-bearing be past, and myomectomy entails a rather higher operative risk and the possibility of a return of fibroids. But in such circumstances the surgeon may feel disposed to advise the adoption of X-ray treatment rather than to undertake what seems to him to be an undesirable surgical procedure.

4. *Certain characters of the tumours.* When a tumour is solitary and pedunculated, and not associated with excessive bleeding, a myomectomy may properly be done, whatever the age of the patient, and the chances of pregnancy may be. Even an interstitial tumour unassociated with hæmorrhage may be enucleated. In fact, when none of the previously considered factors have to be considered, the deciding question will probably be—What is the simplest and safest operation?

The Limitations of Myomectomy.

We have so far considered conditions in which myomectomy should be performed unless there is some strong reason to the contrary. We have now to enumerate those in which myomectomy should not be performed unless there is some preponderating reason for it.

1. *The age factor.* After the age of 40 to 45 I consider that hysterectomy should be the rule, especially when there are multiple fibroids and when there has been excessive hæmorrhage.

2. *The condition of the uterine appendages.* When fibroids are associated with double tubal disease or with bilateral ovarian tumours, hysterectomy is the proper procedure.

3. *Size and position of the tumours.* Whatever the position or number of the tumours, if myomectomy is going to leave a battered and useless organ, hysterectomy should be performed. Cervix-fibroids almost invariably call for hysterectomy, though I have occasionally enucleated the tumour even in these cases. A fibroid in the broad ligament may, if enucleated, leave the uterine vessels in a highly vulnerable condition: my first myomectomy was of this kind, and I had to re-open on account of hæmorrhage.

The mere number of the tumours does not greatly matter, as long as a good and serviceable uterus is left.

4. *Excessive hæmorrhage.* When a patient has had great losses and is seriously drained thereby, hysterectomy should be the rule. If urgent reasons call for an attempt at myomectomy the uterine cavity must be opened, and any submucous or intra-uterine growth must be removed. Otherwise hæmorrhage will continue, and the operation will have been performed in vain.

5. *The temperament of the patient.* Just as there are a few women whose temperament renders it important to save the uterus, so there are others whose temperament will turn the scale in favour of hysterectomy. They are the patients to whom an operation is such an ordeal that whilst they will face it bravely if they have the assurance that it is going to mean a definite cure, they could not tolerate the prospect that the ultimate result of the operation might be doubtful. With them even considerations of possible future pregnancy and of preservation of femininety have no weight compared with the all-important need for being completely and finally cured. With such a patient, if there is any doubt at all as to the issue of a myomectomy, hysterectomy should be performed.

Myomectomy during Pregnancy.

Fibroids associated with pregnancy do not necessarily call for surgical treatment. When they are causing no symptoms, and do not seem likely to interfere with labour, it is best to leave them alone, always provided that the patient can be kept under observation so that operation can be undertaken if urgent symptoms arise, and that the medical attendant realizes that there is the possibility of some complication arising during labour. After the confinement the fibroids can be dealt with on their merits.

Surgical treatment may take the form either of myomectomy during pregnancy, or of Cæsarean section combined with myomectomy or hysterectomy at term. In exceptional cases hysterectomy in the early months of pregnancy may be required, but it should only be performed if symptoms are urgent and there are cogent reasons against the adoption of conservative procedures.

Myomectomy during pregnancy is indicated in three groups of conditions. First, when the tumour or tumours appear to be increasing rapidly in size; secondly, when the patient is suffering from pain, pressure symptoms or indications of septic or degenerative changes in the tumour; thirdly when the position of the fibroid makes it probable that labour will be obstructed, in which case myomectomy is performed for the purpose of avoiding the necessity for Cæsarean section and of allowing the confinement to take place naturally.

In the second group, severe and persistent pain is a sufficient indication in itself. The effects of pressure may be exerted in

relation to the bowel, the bladder, the diaphragm, the iliac vessels, or the nerves of the sacral plexus; and any one of these may call for interference. With regard to degenerative changes it is well known that when fibroids are associated with pregnancy they are specially liable to undergo that form of necrobiosis known as " red degeneration "; and that the onset of this process is frequently marked by pain so acute and severe as to simulate the torsion of the pedicle of an ovarian tumor. In one of my cases operation was undertaken under the impression that the patient had an ovarian cyst with a twisted pedicle. In the other cases myomectomy was the intended operation.

In all I have had 13 cases of myomectomy during pregnancy, and I have thought them of sufficient interest to make a tabular statement of them (Table III).

TABLE III.

Results of myomectomy during pregnancy.

No.	Age.	Date of Operation.	Period of Gestation.	Result.
1	35	Jan. 11, 1909.	4 months.	Normal confinement on June 8th, 1909. Mother and child alive.
2	39	April 15, 1912.	4½ months.	Normal confinement, Aug. 25, 1912. Mother and child alive. This was the first pregnancy.
3	34	March 17, 1913.	3½ months.	Normal confinement, Sept. 8, 1913. Mother and child alive.
4	29	Oct. 14, 1914.	4½ months.	Confinement at 7½ months Jan. 1915. Mother and child alive.
5	34	Oct. 7, 1915	3 weeks.	Confinement June 21, 1916. Baby injured at birth and died 3 days later. Confinement of a healthy child in May 1920.
6	35	Oct. 11, 1915.	2 months.	Confinement May 10th, 1916, contracted pelvis, four days labour; child died shortly after. Became pregnant again, delivered successfully by Cæsarean section Jan. 16, 1919.
7	37	April 17, 1916.	6 months.	Normal confinement, Aug. 27, 1916. Mother and child alive.
8	37	Oct. 9, 1916.	3 months.	Confinement at full time: mother had eclampsia and died. Child stillborn.
9	40	Dec. 30, 1918.	3 months.	Confinement June 29, 1919. Instrumental delivery. Mother and child alive.
10	36	Nov. 25, 1919.	a few days.	Normal confinement, Aug. 12, 1920. Mother and child alive.
11	36	Feb. 5, 1920.	4 months.	Normal confinement, July 5, 1920. Mother and child alive.
12	38	March 4, 1920.	3 months.	Unknown. This was the first pregnancy.
13	43	April 12, 1920.	6 weeks.	Unknown.

The period of gestation ranged from a few days to six months. In the case of "a few days" the fact of pregnancy was not known at the time: the tumour was a large subperitoneal one, and the first intimation I had of the pregnancy was two months after the operation, when the patient presented the signs and symptoms of a two months pregnancy and stated that coitus had taken place two or three days before the operation and not since.

In case 11 the patient, aged 36, had been married 10 years, and this was her first pregnancy. The uterus was a mass of fibroids, and in other circumstances I should have had no hesitation in performing hysterectomy, but a child had been long desired, and this was obviously the patient's only chance. I removed 10 fibroids, several being the size of a fist, and one partly necrotic. Some were pedunculated, but several had to be enucleated from the substance of the uterine wall. She had a normal confinement at term.

The results of the last two I have been unable to trace. In the remaining 11 pregnancy was not interfered with, and all went to full time except one whose labour came on at seven and a half months, the child was alive and survived.

In case 8 the mother developed eclampsia and died, and the child was still-born. Two other children died a few days after birth from injuries during labour, one being in a case of contracted pelvis. Both mothers had the satisfaction of a living child subsequently; the one with the contracted pelvis being delivered by Cæsarean section.

It is evident that myomectomy during pregnancy is a most satisfactory operation.

Chronic Endocervicitis and its Treatment.

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From a close study of 84 cases of uncomplicated endocervicitis, its bacteriology, pathology and treatment, I am convinced that the condition as a distinct pathological entity is worthy of more scientific attention than is accorded it in most modern text-books.

It is probable that the condition is responsible for many cases of sterility. Inasmuch as the condition is an infective one there is bound to be a certain amount of absorption of poisonous bodies from the infected area, and this would account for the degree of anæmia and debility from which the patients usually suffer.

Chronic endocervicitis is an inflammatory process involving the cervical tissues, particularly the lining membrane of the cervical canal. It is due to the presence of bacteria. It is a distinct pathological entity apart from endometritis.

According to Curtis [1] the cervical mucosa is very susceptible to infection, while the corporeal endometrium is practically immune. De Lee [2] affirms that the closed cervix is infected in its lower third, the signs of infection disappearing as the upper third is reached. The work of Sturmdorf [3] and Curtis confirm this.

In the majority of the cases which I have investigated there has been a complete absence of signs and symptoms referable to the body of the uterus, such as tenderness, enlargement of the body or changes in the menstrual function such as menorrhagia or metrorragia. Another point which I think strengthens the above view is that eradication of the infected area of the cervical canal, without interference with the interior of the uterus, leads to a complete restoration of health of the patient.

Ætiology.

The condition is common to all women, the incidence in my series being highest in multiparæ between 30 years and 40 years, next 20 years and 30 years, and least in young unmarried girls.

The disease arises as a result of infection from without, either as a direct infection of the cervical canal as in gonorrhœa, infection of cervical wounds received during labour or operation, or, as in the case of the young girl with intact hymen, direct spread upwards from the external genitals.

This latter mode of infection may be denied by those who still hold the view that the vaginal secretion is capable of preventing

infection travelling upwards. I am prepared to admit the truth of this under normal healthy conditions. Under certain abnormal conditions, however, I have reason to believe that this mode of infection is possible. Normally the vaginal secretion is acid while the cervical secretion is alkaline. The amount of cervical secretion is, as a rule, small apart from menstruation, consequently its neutralizing action upon the vaginal secretion will only extend to the vicinity of the external os and the posterior fornix in a normally situated uterus.

If from any cause the cervical secretion is greatly increased, as in endocervicitis, the acidity of the vaginal secretion is reduced almost to the point of neutrality throughout the vagina. As a result of this the bacteria which are usually numerous in the lower portion of the vagina, have little difficulty in spreading up along the warm column of fluid, which is, as a rule, only faintly acid in these cases.

In those cases of endocervicitis in the virgo intacta investigated by me, five showed certain stigmata which one usually associates with masturbation. Three admitted the fact. Sexual excitation is accompanied by congestion of the pelvic organs, and if frequently indulged in brings about a condition approaching chronic congestion. This congestion induces hyper-secretion of the cervical glands, in other words leucorrhœa. The external genitals become bathed in this vaginal discharge, the bacteria which are always present spread up to the cervix and the glands become infected. Once the glands are infected the presence of the organisms and their toxins keep up the hyper-secretion, and so the condition of endocervicitis is established.

Symptomatology.

The predominant symptom in all cases is the vaginal discharge and the discomfort arising therefrom. This discharge varies greatly in colour, consistence and quantity; the most usual type is the thick white mucoid variety, but it may be thin, white, yellow or green. It is extremely difficult to gauge the amount of discharge, but an idea may be arrived at from the number of diapers used by a patient of cleanly habits in a certain time. The discharge is usually more profuse in the morning and just before and after menstruation. In those cases in which there has been a preceding history of gonorrhœal infection the discharge has a tendency to retain the yellow colour and is usually muco-purulent. General debility, lassitude, anæmia, backache and constipation are the other symptoms which go to complete the picture of chronic endocervicitis. It would seem that the general condition of ill-health is due in no small measure to the absorption of poisonous bodies from the infected cervical canal. In about 95 per cent. of these

cases chronic constipation is also present. If these two conditions are dealt with the patient usually makes a rapid recovery.

The menstrual function does not seem to be influenced to any marked extent in these cases of endocervicitis, and only a small proportion of my series complained of dysmenorrhœa. About one-third of the cases complained of pain in the left side. This may be due to the loaded condition of the lower bowel or to a varicose condition of the veins of the left broad ligament.

Pruritus vulvæ. This distressing condition is complained of not infrequently. According to Leslie Roberts it may be followed by a dry, scaly, patchiform eruption, probably due to the growth of the staphylococcus albus. In 11 of my cases complaining of irritation I have been able to demonstrate an adherent præputium clitoridis, a condition very similar to that found in young boys with long tight foreskins. Beneath the prepuce one can usually fine small sago-grain-like particles of inspissated smegma. That the pruritus may be produced by this condition is proved by the fact that a cure is at once brought about by freeing the prepuce and clearing away the granules. I regard this condition as a very potent factor in the production of "bad habits" in young girls at puberty, and, as pointed out above, it may be the primary factor in giving rise to the type of endocervicitis found in the virgo intacta.

Sterility.

Knowing the disease to be an infective one, it might be expected that sterility would play a large part in the symptomatology. In my series the analysis is as follows:—

37 per cent. sterile though exposed to conception;
39 „ one or more children, no miscarriages;
25 „ „ „ „ one or more miscarriages;
2 „ miscarriages only.

Whilst these figures are interesting, the number of cases examined is too small to base any definite conclusions thereon. At the same time it is only reasonable to expect that an infective condition such as this is would present a definte bar to normal conception.

Pathology.

Endocervicitis may be divided into two forms—acute and chronic. The acute form usually found in gonorrhœa and following infection of cervical wounds due to labour or operation, is seldom recognized as a separate pathological entity. The chronic form may follow the acute or may arise as a chronic condition *per se*. The naked eye appearances vary considerably. The cervix may appear quite normal except for the thick tenacious yellowish mucus issuing from the os. The cervix may or may not be hypertrophied.

In old-standing cases the cervix is usually hypertrophied, and is

harder than normal. The same holds good with regard to erosion. The longer the condition has been in existence the bigger the erosion. In some cases the erosion is confined to the posterior lip. This is usually found in association with retroversion. The size of the erosion depends largely upon the area of the cervix, which is constantly bathed in the pathological fluid which collects in the posterior fornix. Old lacerations may also be seen.

Microscopical sections, taken vertically through the cervix so as to include the canal, the erosion and the healthy portion of the vaginal surface show :—

(1) Glands hypertrophied, epithelium well formed and showing goblet cell formation.
(2) Blocked gland ducts.
(3) Small dilated cysts lined by low cubical epithelium.
(4) Areas in which the pavement epithelium has been shed.
(5) Small round cell infiltration around the basement membrane of the glands. Scattered areas of small round cells throughout the cervical tissues, and particularly well marked beneath the eroded area.
(6) A varying degree of fibrosis.

All or a few of these characteristics can be seen in any section. In some cases the eroded area appears to be composed of hypertrophied gland tissue—papillary erosion. In others the eroded area presents the appearance of a healthy granulating surface—granular erosion. Both these forms are apt to bleed easily on touching, and so are liable to be mistaken for early malignancy, especially in elderly women.

Bacteriology.

A bacteriological examination of the cervical canal is by no means a simple procedure. Unless very great care is exercised contamination of the swab is likely to take place by touching the vaginal wall, vaginal surface of the cervix, or the speculum, thus rendering the examination useless. The routine method, which I have found to be the easiest and at the same time minimizes the risks of contamination, is as follows :—

The patient is placed in the dorsal position with knees drawn up. A sterilized glass Ferguson's speculum is passed and manœuvred until the cervix fits into its upper end. Sometimes there is difficulty in getting a good view of the os owing to the backward projection of the cervix into the posterior fornix. This can be obviated by pulling on the anterior lip with a sharp hook. The cervix, having been thoroughly exposed, is wiped dry and clean with sterilized gauze swabs, and a sterile throat swab is pushed into the cervical canal and rotated. The swab is replaced in a sterile test-tube and

conveyed to the laboratory and several media inoculated. These media are examined in 24 hours and 48 hours.

Out of 36 cases of chronic endocervicitis which have been investigated in this way three had a definite clinical history of gonorrhœal infection one to two years previously.

Results of bacteriologcal investigation of cases :—

Total cases examined	66
Positive growths in 24 hours	92.43 per cent.
Negative in 24 hours and 48 hours	7.57 „

Types of organism found :—

Staphylococcus albus	48.48 per cent.
„ „ and B. coli	7.57 „
„ „ „ streptococcus	6.06 „
„ „ „ gonococcus	3.93 „
„ „ „ M. catarrhalis	1.51 „
„ „ „ tetragenus	1.51 „
Staphylococcus aureus	1.51 „
„ „ and streptococcus	1.51 „
Streptococcus	6.06 „
B. coli	13.63 „
„ and tetragenus	1.51 „

It will be seen from this that the staphylococcus, either alone or in association with some other organism, is by far the commonest inhabitant of this region.

In 18 per cent. of the cases investigated dermatitis was present, causing intense irritation. This dermatitis varies considerably in extent. In most cases it is confined to the vulva. In one of the above cases it had spread extensively over the thighs, and in another practically all over the body. In all probability this dermatitis is caused by the staphylococcus which has its virulence increased by its sojourn in the cervical canal.

Treatment.

From a study of the microscopical sections, and from the fact that the condition is an infective one in which the bacteria are in the glands, it is quite obvious that treatment to be of any avail must remove the causal agent. It is because most of the methods advocated for the treatment of endocervicitis do not remove the causal agent that they either fail to bring about a cure, or at the best only give a temporary relief. Some of these methods are caustics, curetting, douching, tampons of various makes and ingredients, and some form of trachelorrhaphy. To deal with these *seriatim* :—

Drugs and caustics. Most of these only bring about a temporary cure. They kill off the bacteria on the surface of the canal, but do not reach those deep in the lumen of the glands. In

fact many of them form, with the mucus present, a protective covering for the bacteria in the deeper tissues. As soon as the antiseptic affect has worn off the bacteria come out and reinfect the surface.

Curetting. It is impossible to remove all the gland tissue of the lower two-thirds of the canal with any curette, still less is it possible to remove the bacteria. Curetting also has the disadvantage of leaving a raw surface which has to heal as best it can in, to say the least, very doubtful surroundings.

Douching. This type of treatment is one which is still largely used. Many women are condemned to douche two or three times daily in order to gain a little comfort from this distressing condition. To my mind, it is a confession of failure on the part of the doctor who orders the douching for the treatment of endocervicitis, since it cannot possibly effect a cure. On the other hand, douching tends to keep up the discharge by inducing congestion and so hypersecretion of the cervical glands. There is also the danger of introducing bacteria from the outside into the upper portion of the vagina.

Trachelorrhaphy. Most operations on the cervix, it seems to me, were devised without due regard to the bacteriology of the cervical canal. One is advised in almost all these operations to leave the mucous membrane of the canal intact in order to prevent stenosis. It is because of this infected mucous membrane that many of these operations prove failures.

Vaccines. During 1914 and the early part of 1915 I treated, with Doctor John E. Gemmell, 33 cases of chronic endocervicitis with vaccines. Autogenous vaccines were used in every case, the injections being given weekly in increasing doses until a good local reaction was obtained. No local treatment was adopted in the majority of the cases. While many of the patients admitted "feeling better in themselves" during the time they were getting the injections, so far as the local condition was concerned the treatment was disappointing. Having given an extensive trial to all the above methods and finding them unsatisfactory, I determined to seek "fresh fields and pastures new."

Sloan [4] and Somerville [5] reported very good results in the treatment of endometritis with ionization. It was from reading their articles that I conceived the idea of applying ionizaton to the cervix alone in these cases of chronic endocervicitis.

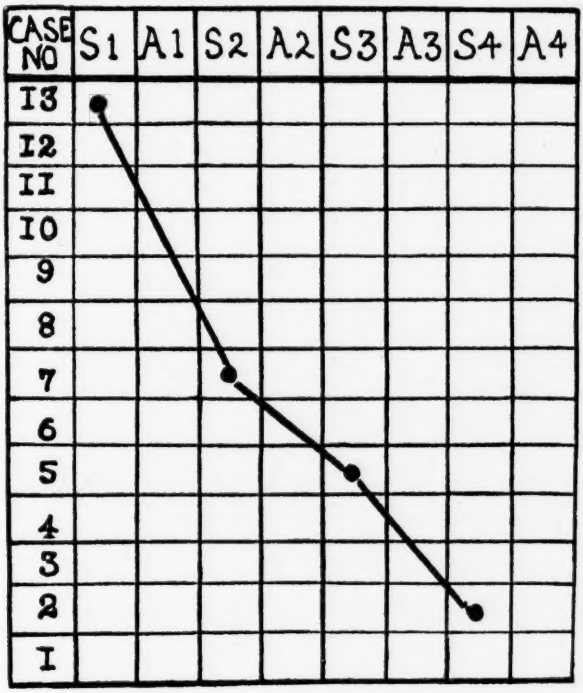
Ionization.

On theoretical grounds at least ionization seems to be the only scientific method of applying antiseptics to the cervical canal. In endocervicitis the bacteria are in the gland lumen, and if a cure is to be wrought the antiseptic must be brought into contact with them.

For this it is necessary to increase the penetrative power of the drug used. Electricity appears to be the only means of doing this at our disposal.

Gautier[6], in experimenting on the uterus of a rabbit, found he got penetration through the entire uterine wall by using a copper electrode with an electric current of 20 milliampères for 10 minutes. The thickness of the rabbit's uterus is about one millimetre. The thickness of the lining of the cervical canal is seldom as much as one millimetre. If it is possible to get penetration of antiseptics to the depth of one millimetre all round the cervical canal, there is a reasonable hope that the bacteria in the lumen of the glands will be reached.

The following graph illustrates the effect of zinc ions in sterilizing the cervical canal. I selected 13 cases in which the first swab proved positive. Ionic applications of 20 milliampères for 10 minutes were made every seven days and a swab taken before each application.



S = swab. A = application.

In 13 cases in which the first swab was positive 7 remained positive after the first application, 5 after the second, and only 2 after the third.

Method of application. The patient is placed in the dorsal position with the knees drawn up. A medium-sized glass Ferguson's speculum is passed until the cervix fits into the upper end. The os is dried and cleaned by means of small sterilized gauze swabs. A swab for bacteriological purposes is then taken from the cervical canal. The reaction of the cervical canal is then taken by means of a roll of litmus paper. A malleable zinc sound is passed into the cervical canal for about one inch or one and a half inches; the speculum is half filled with 0.5 per cent. zinc sulphate solution. The zinc rod is connected with the positive pole of the galvanoset, the negative pole of which is applied to the patient's thigh by means of a metal plate superimposed upon two or three pads of gauze and lint wrung out of warm water. The current is slowly switched on and raised until the milliampèremetre reads to 20 milliampères. It is allowed to run for 10 to 15 minutes. By this time the os and the cervical canal will be seen to be coated with a thick white deposit. At the end of the requisite period the current is cut off and the sound removed. The zinc sulphate is mopped out and a strip of gauze soaked in acriflavine 1 : 1000 is introduced into the vagina. This is removed at the end of 24 hours. This treatment is repeated for three weeks, during which no douching or intercourse is permitted. The external genitals are washed with warm soap and water night and morning, and kept thoroughly dry. Three applications are usually sufficient to render the cervical canal sterile.

Beyond some slight backache for 48 hours following the application the patients seldom complain of any discomfort. In one case, in which there was a history of gonorrhœa 18 months previously, a very acute attack of pelvic inflammation was set alight within 48 hours. In this case I was doubtful about the Fallopian tubes being infected. In another case the uterus was retroflexed, and the menorrhagia from which the patient complained was made very much worse by the applications.

The majority of the patients treated in this way had been complaining of the vaginal discharge for years and had experienced practically every type of treatment without relief. Coincident with the sterilizing of the cervical canal a great improvement takes place in the general health of the patient.

The following is an analysis of the cases treated by ionization :

Cases with erosion	16
Cases without erosion	20
Total	36

Cases with erosion :—

Two were definitely cured, *i.e.*, erosion healed; no discharge for a period of three to four months following treatment.

One case which had been under treatment for 12 months for gonorrhœa, developed symptoms of acute pelvic inflammation following the second application.

Eight cases showed improvement in so far as the amount of discharge was concerned. The erosion remained *in statu quo ante* even after six applications.

Two cases were not improved at all.

Three did not carry out the full course of treatment.

Cases without erosion :—

Thirteen were cured, *i.e.*, no discharge and no discomfort for a period of one to four months following treatment.

One case, in which a supravaginal hysterectomy had been performed some years previously was not improved even after seven applications.

One case in which post-climateric changes in the uterus and vagina were marked, resisted all treatment.

In one case associated with retroflexion of the uterus the symptoms seemed to be aggravated by the applications.

Four cases did not carry out the full course of treatment.

It would appear from a study of these results that :—

(*a*) In cases of endocervicitis associated with erosion ionization will improve matters in so far as the amount of discharge is concerned, but it is not of much value in expediting the healing of the erosion.

(*b*) In cases of endocervicitis not associated with erosion or with any intra-pelvic abnormality, ionization is of great value.

(*c*) Cases in which there is some intra-pelvic complication, such as inflammation of the tubes or displacement of the uterus, are not suitable for ionic treatment.

For those cases associated with erosion the only treatment which I have found to be satisfactory is the removal of the erosion and the lower two-thirds of the cervical canal.

The operation which I have adopted was that devised by Sturmdorf, of New York. It has been beautifully described by Matthews[7]. The operation consists in coning out the lower two-thirds of the cervical canal and covering in the raw area with

healthy flaps from the vaginal surface of the cervix. The part removed consists of a cone which has for its base the eroded area, its apex the upper third of the cervical canal. By this operation the whole infected portion of the canal is removed. Healing as a rule takes place rapidly, and the patient can return home at the end of eight or ten days. I use 20 day catgut sterilized in iodine and allow the sutures to come away.

I operated upon 14 cases of chronic endocervicitis associated with erosion which had resisted all forms of palliative treatment, including ionization. The majority of these patients had been under treatment for periods varying from six to 18 months. Without exception these patients, within a period of three weeks to a month from the date of operation, had quite recovered their normal health, and all discomfort, including discharge and backache, had disappeared.

Sufficient time has not yet elapsed to enable me to express an opinion as to the effect this operation has on conception, pregnancy or parturition. Magid[8], in dealing with obstetrical end-results of this operation, states: "The operation has no unfavourable effect on the possibility of future conception, pregnancy or delivery." For my own part, I see no reason why it should give rise to trouble.

Summary.

(1) Chronic endocervicitis should be recognized as a distinct pathological entity apart from endometritis.

(2) Any discharge from the vagina which induces discomfort in the patient is pathological, and is usually due to chronic infection of the cervical canal.

(3) That the condition is an infective one is proved by the fact that a positive culture can be obtained in 92 per cent. of cases. In 50 per cent. of cases staphylococcus, either alone or in association with some other organism, is present.

(4) Applications of various drugs, douching, tamponage, etc., give only temporary relief because the antiseptics do not reach the infecting agent in the lumen of the glands.

(5) Ionization will bring about a marked improvement in those cases in which erosion is not present.

(6) For those cases associated with erosion the only method which will bring about a cure is the removal of the lower two-thirds of the cervical canal, including the erosion.

I would like to tender my sincere thanks to Dr. John E. Gemmell for his kindness in allowing me to try the effect of vaccines on cases of chronic endocervicitis selected from his out-patients; to Dr. Leslie Roberts for his kindly help and interest, particularly in

those cases in which certain skin lesions were associated with the vaginal discharge; and to Dr. L. S. Ashcroft for his help in working out the bacteriology and pathology of the condition.

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Notes on Three Cases of Chorea Gravidarum.

By Ewen J. Maclean, M.D., F.R.C.P. (Lond.), F.R.S. (Ed.),

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The cases here described conform to the type of ordinary or Sydenham's chorea as distinguished from Huntingdon's chorea, a graver disease which is a degenerative condition progressing ultimately and inevitably to dementia with chronic miliary encephalitic or meningo-encephalitic change in the cerebrum.

As regards ætiology, the pregnancy toxæmia theory is, as yet, but slenderly supported, and the view that in these cases we are dealing with Sydenham's or true chorea occurring during pregnancy holds the field. This is not surprising when regard is had to such points as the frequency of the history of previous attacks of chorea and of articular rheumatism; the evidences of endocarditis in so considerable a proportion of cases; the detailed resemblance to Sydenham's chorea and the absence, in the large majority of cases, of any of the commonly accepted evidences of toxæmia, *e.g.*, albuminuria, severe vomiting, etc.

On the more general enquiry as to causation, it must be admitted that the reasons advanced by the supporters of the embolic theory leave not a little to be desired. It may be readily agreed that the provocative lesion must be in large part in the encephalon as distinguished from the spinal cord, and that the corpora striata are especially affected. But the encephalic post-mortem findings are unconvincing, and it remains very difficult, in the absence of further proofs, to concur in the assumption of so high a degree of eclecticism on the part of the emboli for the striata. There can, however, be no question as to the claim that in practically every fatal case of chorea submitted to autopsy vegetations are found on the cardiac valves.

The incidence of the disease is commonest in primigravidæ, though it may recur in subsequent pregnancies, and the onset of the symptoms is more frequent during the earlier three months than the middle or later corresponding terms. As in chorea occurring apart from cyesis, one side of the body may be more affected by the characteristic movements than the other.

The milder cases tend to recover, especially under routine treat-

ment, and most authors agree that such cases rarely, if ever, develop mental symptoms, and that they only exceptionally bring about spontaneous interruption of the pregnancy. The severe types, on the other hand, are frequently associated with abortion or premature labour, and these cases are held to be responsible for a maternal mortality as formidable as 20 per cent. to 30 per cent.

This grave form of the disease is rarely exemplified in cases other than those in which the chorea occurs for the first time in association with pregnancy. In exceptional cases, not necessarily severe in type, the symptoms persist in spite of lapse of time and treatment, and may be projected into the puerperium.

Treatment. The milder types respond to rest and a measure of dieting more or less on the lines of Dejerine's dictum "Au lait et au lit," associated with arsenic, bromide, chloral, as symptoms may indicate, and massage in the later stages, especially when paresis of a limb may have replaced or been associated with the choreic movement—screening of the patient to give the impression of the movements being unobserved, is a valuable psychic adjunct. One author claims aspirin in 10 to 15 grain doses every four hours as almost a specific, but I have had no personal experience of its efficacy. It should be borne in mind that in this, as in other forms of disordered function when lapse of time tends to rectification, the drug last used often acquires merit for cure. The treatment of the severe types of chorea gravidarum is a very anxious undertaking. The prognosis, immediate and remote, is bad; drug treatment is largely ineffective; adequate feeding is difficult; evidences of exhaustion supervene and progressively develope; and the mortality-rate, with or without spontaneous termination of the pregnancy, is formidable. There is, I think, sufficient evidence on record to justify the recommendation that, in these cases, the induction of abortion or premature labour before the signs and symptoms of exhaustion become established, is the best line of executive treatment to adopt.

The following is a short account of three cases of chorea gravidarum which have recently come under my care :—

Case I. Mrs. R., æt. 26, has had three children. Appendicitis seven years ago—operation. Always has had dysmenorrhœa. History of rheumatism.

Obstetrical History. 1. Feb. 1919, 28 weeks, induction. 2. Nov. 1919, three months' miscarriage—twins. Last menstruation early May 1921—expected to be confined the middle of February, 1922. Admitted under Prof. Kennedy, 17/12/21, with history of severe choreic convulsions of two months' duration or more; she had two previous attacks each being precipitated by shock and pregnancy. On admission pregnant six months. Having very frequent choreic convulsions and the general condition appears to be depreciating.

The patient was transferred to the Maternity Department 4/2/22 for observation and necessary treatment. The choreic twitchings had improved but were still present. With physical rest, screening, quietness and an occasional dose of chloral and bromide the condition rapidly cleared up, and for fully two weeks prior to onset of labour no symptoms of chorea were visible.

26/2/22. The pateint went into labour and the birth was normal: labour lasted 20 hours.

The patient made a normal and uninterrupted recovery, being discharged from hospital 18/3/22. There were no more choreic fits and mother and child were both fit and well on discharge. Pulse-rate, temperature and urine had been practically normal throughout the course of the case.

Case II. Mrs. H., primigravida, æt. 24. Admitted to the Medical Unit 14/10/21. This patient had chorea 18 months ago which lasted 14 days and finally subsided under medical treatment; she had acute rheumatism six months later and had again shown signs of chorea since 1/10/21, the condition becoming more violent in spite of treatment. She vomited almost continuously for three days previous to admission to hospital.

She is two months pregnant: the tongue is coated, cardiac examination reveals a systolic thrill and an apical systolic bruit, and the general appearance is pallid and very unsatisfactory. She was admitted under Professor Kennedy and in spite of sedative and anti-rheumatic treatment her condition became worse.

In view of the increase of symptoms while under treatment and also on account of the reduced condition generally of the patient she was transferred to the Maternity Department, and 29/10/21 the uterus was evacuated. Almost immediately after this the patient showed improvement, the twitchings becoming very slight in degree and soon disappearing altogether. She was discharged from hospital 17/11/21 completely relieved of all choreic symptoms and with the general condition satisfactory.

Ordinary urinalysis was normal throughout the course of the case.

Case III. Mrs. O., æt. 22, primigravida. Admitted 4/2/22 with the history of having had attacks of chorea off and on for the last four years. The chorea was attributed originally to overwork. There had been occasional epistaxis and the patient and her father were often affected with rheumatism.

The patient was six and a half to seven months pregnant.

The left side appears to be powerless for intentional movement: the fingers of both hands move in a jerky manner: the left leg from the knee downwards moves jerkily: speech has been stammering but she is now much improved in this respect. The tongue is protruded and withdrawn in a jerky fashion.

The choreic movements are not exaggerated: the patient can talk quite rationally and she has control over the movements when ordered to. The heart is somewhat hypertrophied but not dilated, and there are no bruits. Urine examination, pulse and temperature so far are normal.

29/3/22. Since admission treatment has consisted of rest, silence, potassium, bromide, arsenic, light diet and general psychic control.

The choreic symptoms are very much improved and the only obvious defect now present is some general excitement and a slightly hysterical manner of speech. The left-hand grip is still appreciably impaired.

Subsequently normal labour took place with good recovery.

COMMENTS.

While no useful average figures or general deductions can be drawn from so small a number of cases, the following points are, perhaps, noteworthy :—

(1) The incidence of the chorea occurred in one case in the early months, and in two cases in the later months of pregnancy.

(2) All the cases afforded a history of antecedent chorea or rheumatism or both.

(3) Two of the cases were of the mild type, one of the rather severe type.

(4) Two of the patients were primigravidæ, and one had given birth to three children.

(5) None of the patients had albuminuria or other evidence of pregnancy-toxæmia.

(6) None showed any tendency to spontaneous abortion or premature labour.

(7) In the severe case, in which abortion was induced, the relief of symptoms was practically immediate.

Hydrometra Associated with Absence of the Vagina and Genital Tuberculosis.

By Daniel Dougal, *M.C.*, M.D., Ch.B. (Victoria University),

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The patient from whom I removed the specimen was a girl, aged 19 years. She was brought to me on account of delay in the onset of menstruation and because she suffered from extremely severe headaches occurring monthly and lasting three days. These headaches commenced twelve months previously. She also complained of always feeling tired and done up. Apart from the headaches, she had no actual pain.

The girl was well-developed and of healthy appearance, and had had no illnesses apart from scarlet fever and measles during childhood.

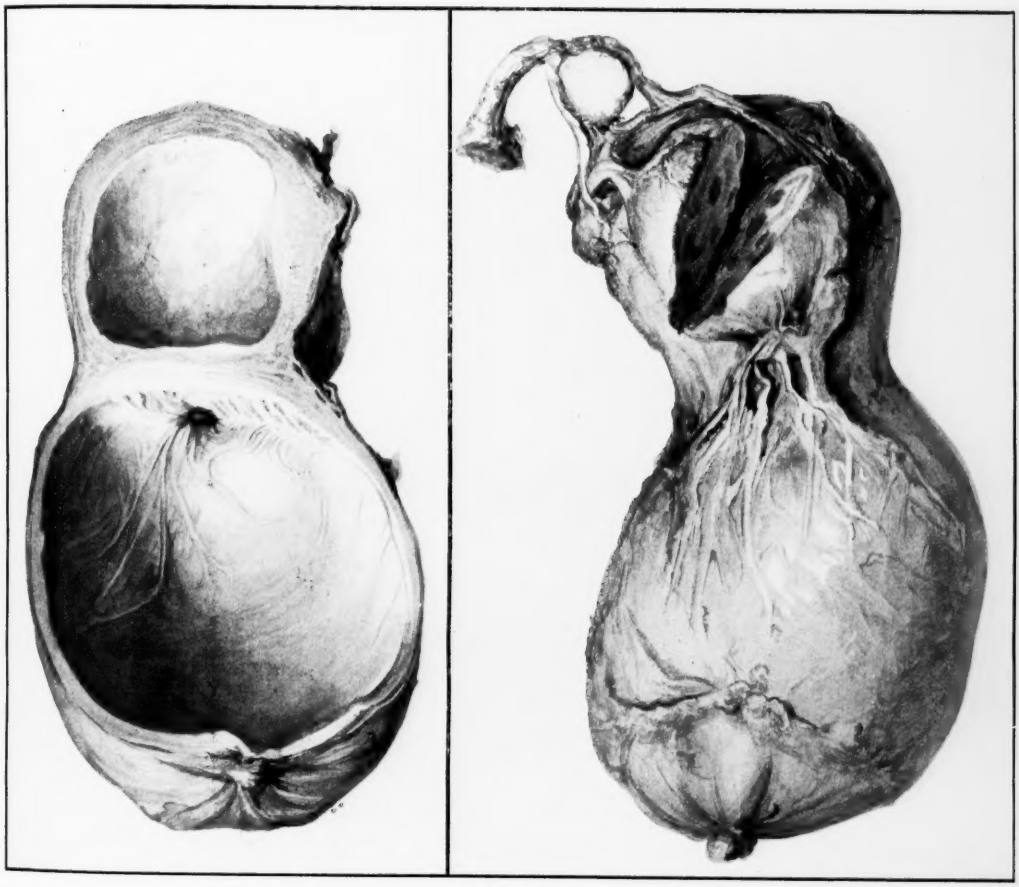
On abdominal examination, I found a mass above the pubes, rather to the left side, and apparently about the size of a fœtal head. There was no tenderness. Inspection of the external genitals showed the vulva to be well-formed except that no vaginal orifice was present. There was a well-developed hymen of cribriform type, but underneath it merely a smooth skin surface. There was no bulging.

Rectal examination confirmed the absence of the vagina, and I was able to feel, high up in the pelvis, the tumour previously palpated through the abdominal wall.

I made a diagnosis of hæmatometra with absence of at least part of the vagina, and advised a careful examination under anæsthesia and an attempt to reach the retained blood from below. The mother was agreeable to this, and the patient was admitted to St. Mary's Hospital in due course. I incised the skin under the hymen and dissected up for about an inch between bowel and bladder. Above this point these became very adherent, and as I was still at least two inches from the tumour, I thought it best to give up the attempt and explore later through the abdomen, after explaining the state of affairs to the patient's mother.

I opened the abdomen a week later and found the state of the pelvic organs to be as follows:—

The body of the uterus was somewhat enlarged, elastic in



Dr. Dougal's case of Hydrometra associated with absence of the Vagina and Genital Tuberculosis.

consistence and continuous below with a tense cystic swelling, the size of a goose's egg, which extended deep into the pelvis between the bladder in front and the rectum behind, the latter being adherent to its posterior surface.

There were numerous adhesions between the top of the uterus and the omentum, and near the right cornu was a yellow calcareous nodule the size of a bean.

The right Fallopian tube appeared to be absent, and was probably destroyed in the formation of scar-tissue round the nodule. The right ovary was cystic, and lay on the right wall of the pelvis to which it was adherent.

The left Fallopian tube and ovary were represented by an adherent mass fixed to the back of the broad ligament, and containing a quantity of calcareous material. Numerous calcareous glands were present at the ileo-cæcal junction.

I decided that any attempts at conservative measures would be useless, and proceeded to remove the uterus and appendages. After tying the infundibulo-pelvic ligaments on each side and dividing the broad ligaments, I commenced the separation of the lower cystic mass. The bladder was easily pushed off in front and the adherent bowel detached behind. The uterine vessels were small, and joined the lower cystic mass about the junction of the upper and middle thirds. On the left side the ureter was adherent to the mass just below the vessel, and had to be stripped off. The right ureter was well out of the way. After dividing two bands of tissue, which I took to be the utero-sacral ligaments, I was able to pull the whole mass up, and then found that it had a narrow attachment to the pelvic floor. On cutting this across some yellow mucinous material escaped from the tumour. The operation was completed in the usual way, and the patient made a good recovery.

The specimen is an interesting one, and consists of a dumb-bell shaped tumour, the upper part of which represents the body of the uterus and the lower part the cervix.

On cutting sagitally through the uterus two cavities are seen, both filled with thick tenacious mucus, containing large quantities of cholesterine crystals. The cavities communicate with each other by a circular opening one-third of an inch in diameter. The wall of the upper cavity is thick and muscular, but the lining membrane is flattened out and has a very incomplete covering of epithelium. No actively secreting cells or glands are visible. The lower cavity has a thinner and more fibrous wall, and the mucous membrane is well preserved, especially at the upper part. The epithelial lining consists of tall columnar cells, and there are many glands. The epithelial elements appear to be actually secreting mucus.

A section through the pedicle connecting the uterus with the

floor of the pelvis shows fibrous tissue only and no epithelial structures. Both ovaries contain follicles and corpora fibrosa.

In no part of the specimen could I find histological evidence of tubercle, but I feel sure that a tuberculous peritonitis was present at some time in the patient's history, although I have been unable to obtain any clinical evidence of it.

There are three definite lesions in this case :—

1. Total absence of the vagina.
2. Adnexal disease and peritoneal adhesions, presumably resulting from a tuberculous infection.
3. Distension of the cervix and body of the uterus with secretions as a result of excessive activity of the cervical mucous membrane and obstruction of the natural outlet.

Both ovaries were physiologically active, and, therefore, the absence of menstrual blood from the uterus must be explained by the fact that the hydrometra was present before puberty and either destroyed the mucous membrane of the body by pressure or raised the intra-uterine tension so high that bleeding could not occur.

In conclusion, I suggest that the sequence of events was as follows :—

The absence of the vagina was developmental.

During infancy or childhood the patient had a tuberculous peritonitis with a resulting salpingo-oöphoritis. In the course of this illness the uterus became extremely congested with a consequent increase in the amount of mucous secretions. The cervix, being larger than the body in the infantile uterus, would contribute a larger amount.

Having no natural outlet the secretions were retained and gradually distended the cervical canal and uterine cavity.

The patient reached puberty, no menstruation was possible on account of the hydrometra, but severe monthly headaches occurred, and led to her seeking advice.

A Fatal Case of Post-Partum Eclampsia Associated with Accidental Hæmorrhage.

By Frances Ivens, M.S., M.B. (Lond.),

Gynæcological Surgeon, Stanley Hospital; Surgeon, Maternity Hospital, Liverpool.

E.A., aged 23, primigravida, was admitted to the Liverpool Maternity Hospital at 12.45 noon on September 29, 1921.

The patient became pregnant in January 1921, but had two periods in February and March. She was well until a month before admission, when she consulted her doctor for nose-bleeding. The day before admission she walked quickly to the post, and after her return home was seized with sudden abdominal pain, fainted and became very pale. She believed herself to be near term and sent for the midwife. Pains continued all night, and Dr. Edis was sent for and ordered removal to hospital, with a diagnosis of concealed accidental hæmorrhage. At 9 o'clock there was a big gush of blood.

On admission, about four hours later, the patient was very ill, pains regular, pulse-rate 136, and the cervical canal admitted one finger. The uterus relaxed between the pains.

The presentation was a vertex, the head was small and soft, and no placenta was felt. Five ounces of urine were drawn off; the specific gravity was 1012, and a trace of albumin—no excess of globulin—and a few leucocytes were found.

A rectal saline and morphia gr. $\frac{1}{4}$ were given. The patient improved slightly in the afternoon and labour advanced. At 5 p.m. the membranes were ruptured, and 1 cc. of pituitrin was given, but the pains went off. At 2.30 a.m. the patient was delivered of a small dead premature child, weighing $3\frac{1}{2}$ lbs., by low forceps without anæsthesia. Two pounds of blood-clot came away with the placenta, which was compressed and showed white areas, some of which were breaking down.

The next day, September 30th, the patient became restless; no urine was passed, and only a teaspoonful could be drawn off by catheter. There was frequent vomiting. With hot packs the patient perspired freely and rectal salines were retained, but she was restless and delirious. At midnight, September 30th, she had a fit lasting five minutes, followed by four others and died at 2.10 a.m., on October 1st, in the fifth fit, about 24 hours after delivery.

Pathological report on specimens by Professor Ernest Glynn :—

Kidney—macroscopically. There was a series of small anæmic infarcts at the junction between the cortex and medulla forming a narrow irregular strip surrounded by a red zone of blood.

Microscopically. The infarcts are typical, and a few days old because the edges of the necrotic tissue are infiltrated with leucocytes (see Fig. 1). The vasa recta and glomerular vessels in the neighbourhood of the infarcts are thrombosed (see Fig. 1). The thrombi consist of red blood corpuscles, many of which are conglutinated, and a few blood platelets. No fibrin could be demonstrated by Wiegert or Kockel's stains. It is impossible to give a definite opinion regarding the condition of the endothelium of the vessels.

Comment. Had the infarction been more marked the kidney would have presented the appearances characteristic of symmetrical cortical necrosis of pregnancy. In this case, however, only about a third of the cortex has been destroyed. The comparative absence of blood platelets in the thrombi distinguishes it from a case described by E. E. G. and H. Briggs in the *Journal of Pathology*.[1]

Liver. The gland cells in the middle and inner zone of certain lobules show fatty metamorphosis and coagulation necrosis; many have totally disappeared. (Fig. 2.) No fibrin could be demonstrated.

Uterus. The muscle fibres are shortened and about three or four times the normal thickness. The cytoplasm, instead of being finely reticular, is homogeneous, and stains intensely yellow with van Gieson. Most of the nuclei have totally disappeared (see Fig. 3). The majority of the blood-vessels are empty, but laminated thrombi are present in a few. There is an extensive extravasation of blood in certain areas between the muscle fibres; here also blood pigment can be seen (see Fig. 4).

Suprarenal. The most striking change is the presence of numerous small circumscribed areas of lymphocytic infiltration.

Thyroid. Normal.

Pancreas. Normal.

Spleen. Normal except for a slight pigmentation with blood.

1. Glynn, E. E., and A. Briggs. "Symmetrical cortical necrosis of the kidney in pregnancy." *Journ. Pathol. and Bacteriol.*, vol. xix (1915).

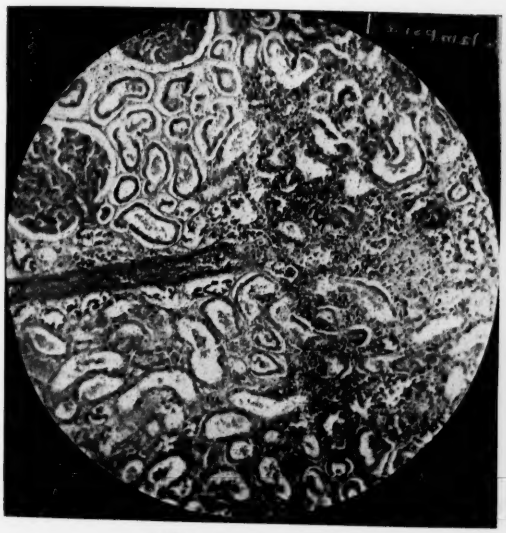


FIG. 1. × 140.

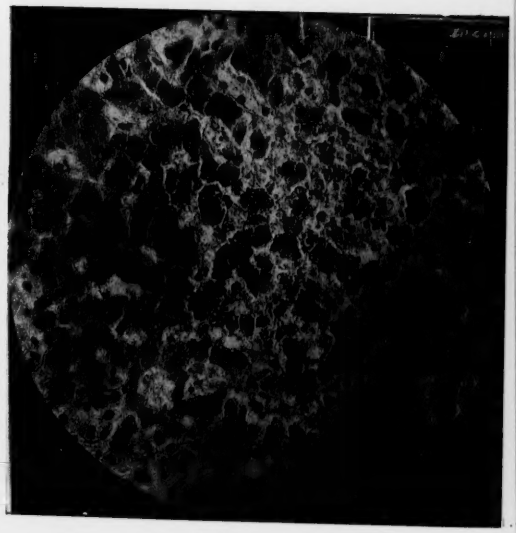


FIG. 2. × 400.

FIG. 3. × 500.

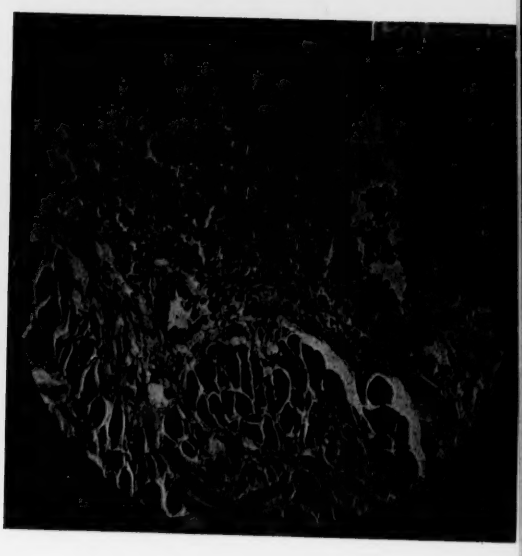


FIG. 4. × 500.

Five Specimens Illustrating Necrobiotic Changes in Fibroids Associated with Pregnancy.

By Frances Ivens, M.S., M.B. (Lond.),

Gynæcological Surgeon, Stanley Hospital; Surgeon, Maternity Hospital, Liverpool.

I. A. *Myomectomy during Pregnancy.*

Mrs. D., æt. 28, primigravida. On admission, August 7th, 1919, she was 21 weeks pregnant.

Vomiting during pregnancy had been very persistent, and had been severe for a fortnight before admission, during which time a swelling on the right side of the abdomen had become very tender and painful.

August 11th, 1919. Myomectomy of an interstitial fibroid, about the size of a large hen's egg, undergoing necrobosis, but not liquefied. Catgut used exclusively.

The uterine cavity was not opened.

The patient made an afebrile recovery and had á normal labour at home.

The macroscopic specimen has unfortunately been lost, but the section shows a very considerable amount of coagulation necrosis, only the surface appearing normal. There are no hæmorrhages.

I. B. *Myomectomy during Pregnancy.*

Mrs. T., aged 41, primigravida, married 18 months, was admitted on January 18th, 1921, 26 weeks pregnant.

Vomiting had been continuous during pregnancy, and there had been pain in the right side, becoming acute for eight days before admission.

A tender cystic mass could be felt on the right side of the uterus.

January 24th, 1921. Myomectomy of a sub-peritoneal fibroid the size of a lemon, catgut again being used.

Part of the tumour had undergone liquefaction. The uterine cavity was not opened.

An afebrile recovery with normal labour at term in the Maternity Hospital.

The section shows hæmorrhages and thrombosis; various stages of muscle degeneration.

II. *Fibroid Uterus removed by Cæsarean Hysterectomy.*

Mrs. B., æt. 42. Third pregnancy, the last child having been born 19 years previously.

Two years later she had had a severe attack of peritonitis. The patient was admitted on June 9th, 1921, on account of severe abdominal pain.

There was a history of $7\frac{1}{2}$ months' amenorrhœa (L.P. Nov. 1920) and a yellow discharge for a month. A hard tender mass could be felt above the umbilicus on the left side of the pregnant uterus. Uterine contractions were present, with pain in the back, and the discharge was blood-stained. The fœtal heart was heard, and a small head could be felt presenting. The patient was kept quiet, and the threatened premature labour subsided.

A month later, July 17th, the membranes ruptured at noon, but there was no dilatation, and the presenting part, the breech, was high.

At 2 p.m. Cæsarean section was performed, and a healthy child, weighing $8\frac{3}{4}$ lbs., was removed. The uterus was generally fibrotic, and contained a large and a small fibroid, both undergoing necrobiosis. The operation was difficult, owing to the almost universal adhesions present.

The patient made an excellent recovery, breast-feeding the child.

The section shows hæmorrhages; no marked thrombosis.

III. A. *Fibroids removed during the Puerperium.* Fibroid uterus removed by hysterectomy after abortion complicated by a pulmonary embolism.

Mrs. H., aged 42, 9-para, youngest child two years old, no miscarriages, but one premature child three years before; occasional attacks of bronchitis.

The patient was admitted on May 9th, 1922, with amenorrhœa dating from December 30th, 1921, until a few days before admission, when there was a reddish discharge.

The patient was about 14 weeks pregnant, and a hard tender mass could be felt on the right side of the uterus.

I decided to remove the tumour by myomectomy, but the day before operation was arranged an abortion took place rather suddenly, on May 15th; about twenty minutes after the patient suddenly collapsed and became cyanosed, with an almost imperceptible pulse. She clutched at her throat and had some twitching of the face. Dr. Burns, who kindly gave first aid during the attack, considered it was probably a pulmonary embolism, and this view was confirmed later by Dr. Bigland.

Although very ill for some days the patient pulled through, and on May 26th I did a supravaginal hysterectomy.

The uterus shows a necrobiotic fibroid on the right side of the body. The patient did well, and was discharged in fair condition.

No hæmorrhages or thrombosis; cells swollen and clear.

III. B. *Fibroids removed by Myomectomy three weeks after normal labour.*

Mrs. B., æt. 29, primipara, was admitted to the Maternity Home at the end of January 1921. During early pregnancy there had been very severe vomiting, and the patient had been under treatment in hospital and the presence of fibroids diagnosed. Two tumours could be felt in the anterior wall, one very mobile, and both were very tender and painful.

The confinement was normal, and there was no rise of temperature.

On account of the pain she had suffered during the later months of pregnancy the patient begged to have the tumours removed. On February 17th, 1921, a small fibroid was enucleated from the right side of the uterus, and a larger sub-peritoneal tumour involved in adhesions to the sigmoid was also removed. Both tumours were necrobiotic, the larger one showing hæmorrhages.

The patient made an afebrile recovery and was able to breast-feed the infant.

Report of Professor Ernest Glynn on Specimens Removed.

One or more sections have been examined from the intra-mural fibroids of five patients; three were removed during pregnancy and two in the puerperium. The sections were stained with hæmatoxylin and eosin or by Van Giesen. They have not been stained for lipoids or fat.

The pathological changes in the fibroids were very similar in four cases, and may be summarized as follows:—

There was marked degeneration of both the muscle and the connective-tissue. In one specimen at least the changes in the former predominated. In the earlier stages the muscle cells were often greatly swollen and shortened and the nuclei pyknotic. The appearances generally resembled coagulation-necrosis rather than hyaline degeneration. Where the degeneration was advanced the whole fibroid was almost homogeneous and destitute of nuclei. Œdema was absent, though one tumour contained a cyst.

2. The line of demarcation between the normal uterine muscle and the fibroid was usually *remarkably sharp*.

3. No thrombi were seen in any vessel.

4. There were localized extravasations of blood but a complete absence of blood-pigment.

5. Leucocytic infiltration was sometimes present.

In the fifth case in which the fibroid was removed three weeks after parturition the degeneration was very slight, but in the affected areas leucocytic infiltration occurred.

Comments. There are at least two possible causes of degenerative changes:—

(*a*) *Thrombosis* produced either mechanically or from changes in the endothelium of the vessels of the fibroid.

(*b*) A *ferment or toxin* acting only on the fibroid, because the cells, being neoplastic, are somewhat atypical and therefore probably less resistant than those of the uterine muscle itself. This toxin appears to be partly endotheliolytic on account of the extravasation of erythrocytes. It is certainly not hæmolytic.

A Case of Unilateral Hæmatokolpos, Hæmatometra and Hæmatosalpinx.

By C. E. Purslow, M.D. (Lond.),
Consulting Surgeon, Birmingham Maternity Hospital.

The patient, who was 16 years of age, was admitted to the Queen's Hospital, Birmingham, on December 20th, 1920, with the following history: Menstruation had commenced in January 1920, and had been fairly regular since; the amount lost was normal, and there was no pain until the July period, when she had a pain in the back passage which lasted one day and caused a desire to defæcate. At each succeeding period the pain became more continuous and severe, and at the September one it extended into the right iliac and lumbar regions, and she had to stay away from work for four days; and at the following period it was agonizing, and she had "to be held down." Her bowels had acted regularly and there had been no retention of urine, though micturition had at times been smarting and painful.

On examination. The external genitalia were normal, the hymen was intact and presented a normal opening. A recto-abdominal bimanual examination disclosed a round, firm mass to the right and somewhat in front of the rectum, and gave the impression of being fixed to the pelvic wall.

Operation. The abdomen was opened in the middle line and the pelvic contents examined. It was then seen that there was a double uterus and that the greater part of the pelvic tumour was formed by the distended right half of a double vagina; this was verified by vaginal examination. The right tube was also considerably distended, and the right uterus slightly distended. The left uterus and appendages were normal.

The right uterus was removed at its junction with the vagina, and the opening sutured and covered by peritoneum; the right appendages were also removed. The abdominal wound was closed. The patient was then placed in the lithotomy position and a free opening made from the normal left vagina into the distended right one and a large quantity of tarry blood evacuated. A drainage tube was fixed in the opening; this was removed three days later.

The patient made a good recovery, and when seen some months later had had no return of symptoms, and there was no sign of distension of the right vagina.

Placenta Prævia in a Double Uterus. Cæsarean Section. Recovery.

By W. Gifford Nash, F.R.C.S. (Eng.),
Surgeon to the Bedford County Hospital.

Mrs. W., aged 35, was seen in consultation on June 14th, 1922. She had previously had three children and was eight months pregnant.

For seven days she had been losing blood and consequently was weak and anæmic.

On examination the uterus was found lying on the right side of the abdomen, but it could be pushed over into a central position. The fœtal heart was heard over McBurney's point and the placental bruit at the lower end of the uterus.

On vaginal examination a curious condition was found. Just inside the os on the posterior wall was found a slit-like pocket and above this and to the right a tight membranous ring which was the internal os. There was a complete central placenta prævia. I thought the pocket might have been produced by examination.

Owing to the weak condition of the patient, caused by the loss of blood, I thought it advisable to terminate labour by Cæsarean section. This was performed in a nursing home. After sewing up the uterine incision I found that the left Fallopian tube was missing, and on further search this was found attached to a second uterus low down in the pelvis.

The decidua from the left uterus came away on the third day. The mother made a good recovery and the child also lived.

Review of Current Literature.

DIRECTOR: FRANK E. TAYLOR,
M.D., B.S. (Lond.), F.R.C.S. (Eng.), M.R.C.P. (Lond.), D.P.H. (Cantab.)

THIS Review will contain the lists of contents, and abstracts of the more important articles, from the following journals, with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges:—

British.—Lancet, British Medical Journal.

American.—American Journal of Obstetrics and Gynæcology; Surgery, Gynæcology and Obstetrics.

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, etc.

Italian.—Annali di ostetricia e Ginecologia.

German.—Archiv für Gynäkologie; Monatsschrift für Geburtshülfe und Gynäkologie; Zeitschrift für Geburtshülfe und Gynäkologie; Zentralblatt für Gynäkologie; Muenchener medizinische Wochenschrift.

It is hoped that the Review of Current Literature will keep the readers of this Journal in touch with current work throughout the world. At the end of each year it is proposed to print an Index of all the subjects contained in the articles of the above journals. Arrangements will also be made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London.—W. E. CROWTHER; MALCOLM DONALDSON, F.R.C.S.; A. C. PALMER, F.R.C.S.; L. DOROTHEA TAYLOR, M.D.; FRANK E. TAYLOR, F.R.C.S.

Birmingham.—HILDA N. SHUFFLEBOTHAM, F.R.C.S.

Manchester.—F. H. LACEY, M.D.; W. R. ADDIS, M.B.

Sheffield.—W. W. KING, F.R.C.S.

Glasgow.—JAMES HENDRY, M.D

Amsterdam.—I. A. WIJSENBEEK.

American Journal of Obstetrics and Gynæcology.

Vol. iv, No. 2, *August*, 1922.

*Morphology of the human fœtus with special reference to the obstetric measurements of the head. CALKINS.

*Brief review of the physiological and embryological genesis of pseudo-hermaphroditism, with report of a case. GOLDBERGER.

*Pre-operative digitalization. GEIST and SOMBERG.

*Reflex gastric symptoms in diseases of the female pelvic organs. ANDRESEN.

*Ectopic pregnancy. GRAFFAGNINO.

*Tubal patency test and the unsealing by simple air-filled pipette. DICKINSON.

Some moot points in the diagnosis of the causes and in the treatment of sterility. HIRST.

Unsuspected male sterility. MACKINNEY.

A review of seventy-five consecutive hysterectomies for fibromyomata uteri. VAN ETTEN.

Observations on the treatment of syphilis in pregnancy in the department of health in Detroit. WELZ and VAN NEST.

The prevention of striæ gravidarum, diastasis of the recti muscles, visceroptosis and ptosis of the breasts in pregnancy. MCPHEETERS.

A method of disposing of the spill in Cæsarean section. CORNELL.

Morphometry of the human fœtus, with special reference to the obstetric measurements of the head. Calkins has studied four hundred and fifty prescribed fœtuses in a most thorough manner and has constructed a formula by which the external body proportions of a fœtus can be deduced from any given single dimension. When a definite and accurate technique intrauterine measurement is evolved the author's data will be of the greatest value, but for the moment his work has no practical application.

A brief review of the physiological and embryological genesis of pseudohermaphroditism, with report of a case. Pseudohermaphrodism is more common in the lower animals than in the human subject.

Cattle often deliver themselves of twins. It frequently happens that the female co-twin, the other being a male, is sterile, and has a modified genital tract resembling the pseudohermaphrodite of the human. Such animals are known as "free martins."

The structure of free martin gonads may be any degree of transformation of ovary into testicle. It is thought that this transformation is due to the hormone action of the testis of the male co-twin.

The author admits a typical gonal development in the human subject cannot be explained upon this basis; but he asks if it is not possible that some inherited deficiency in the primary germ-cell may not account for embryological failure.

He reports a case of pseudohermaphroditismus feminus externus occurring in a child aged 14. Two aunts on the father's side were never known to have menstruated or borne children. The author thinks that this fact supports his suggestion of inherited perversion.

Pre-operative digitalization. A method to reduce post-operative complications. Post-operative complications, especially those involving the respiratory tract, have always caused the surgeon considerable anxiety. Pulmonary complications in almost all instances are dependent upon post-operative vascular conditions. All have noted the fall in blood-pressure following operations, and it is this fall which results in stasis of the smaller vessels. Hypostatic pneumonia is a result of cardiac weakness, and the author is of opinion that all post-operative pulmonary conditions have an analogous ætiology. Phebitis is another complication which is often due to blood stasis with superimposed infection. Post-operative shock is still an unsolved problem, but if blood-pressure can be maintained its effect will be very much lessened. Asthenia after operations is always associated with

low pressure. With these facts in view, it is reasonable to assume that any measure which will help to maintain blood-pressure will be of value in reducing the complications dependent upon vascular disturbances. As digitalis is a powerful cardiac stimulant, the authors decided to investigate a series of cases to determine its value.

The essence of their method was to administer digitalis, or a preparation thereof, for 24 hours prior to operation; but, owing either to a misprint or to mental aberration arising out, a confusion between the imperial and metric system, the details of dosage are difficult to follow.

Sixty-nine unselected cases were treated by the digitalis method and 39 others were used as controls.

Summing up the observations on the two groups the authors were impressed by the diminution in pulmonary complications. They consider that it is free from danger.

Reflex gastric symptoms in diseases of the female pelvic organs. Out of a total of fifteen hundred cases who came to the Brooklyn Hospital Dispensary complaining of gastro-intestinal symptoms, two hundred and sixty showed pelvic trouble as the sole or underlying cause of these symptoms.

From a study of these cases the author concludes that reflex gastro-intestinal symptoms are frequently overlooked, hence a pelvic examination should be made before deciding upon treatment. On the other hand, a diagnosis of reflex symptoms from the pelvis must not be made unless organic disease of the intestinal tract can be definitely excluded.

Evidently extreme care was taken in the investigation of the dyspeptic symptoms, and the paper would be of greater value if a more balanced judgment had been used in the gynæcological aspect of the cases.

Ectopic Pregnancy. This article is a careful comparison between the cases of ectopic gestation treated at the New Orleans Charity Hospital and published records of three other hospitals. As it is entirely statistical it does not lend itself to abstraction though it is well worth careful study.

The author concludes that the age incidence is between 25 and 35 and that pain, which is usually unilateral, with or without bleeding, is present in every case of ruptured ectopic gestation.

Tubal patency test and unsealing by simple air-filled pipette. The author uses a simple curved glass pipette with a rubber bulb attached thereto, in order to determine the patency of the tubes in the place of the elaborate apparatus necessary for gas insufflation methods.

As the rubber bulb is compressed the air should pass through, and if not the finger soon learns to recognize the proper resistance, and the patient's feelings indicate the time to cease. Air leaks at the external os are recognized by applying a small amount of lubricant around the orifice.

Vol. iv, No. 3, *September*, 1922.

*Clinical and embryological report of an extremely early tubal pregnancy; together with a study of decidual reaction, intrauterine and ectopic. DORLAND.

*What is the relation of hypertension to fibroid disease of the uterus? MCGRATH.

*Review of one hundred cases of women with pelvic tuberculosis with special reference to the end results of operative treatment. PETERSON.
*A study of adenocarcinoma of the fundus of the uterus. MEIGS.
Outlining the superior strait of the pelvis by means of the X-ray. THOMAS.
Regarding recent efforts to reduce mortality in childbirth. RICE.
Malignant papilloma of the kidney. DARNALL and KOLMER.
Accidental perforation of the uterus: with a report of three cases. OUTERBRIDGE.
Intermittent aspiratory hyperæmia in gynæcology. YOUNG.
*Report of a case of intractable vulvar ulcer (estiomene) cured by proteus vaccines. HEALY.
A new suture holder for vaginal plastic operations. GRAD.
X-ray and radium in conservative gynæcology. HERTZLER.

A clinical and embryological report of an extremely early tubal pregnancy, together with a study of decidual reaction, intra-uterine and ectopic. Dorland reports a very complete study of an ectopic embryo which measured 2.8 mm., and showed only fifteen somites. He regards it as the earliest recorded tubal pregnancy. The Fallopian tube showed no sign of decidual reaction. The reader will look in vain for the "study of decidual reaction, uterine and ectopic," for the nine lines on the subject only amount to a statement that the stroma of the tube was in a chaotic state, which was thought to result for a lack of the protective action of the decidual cells.

What is the relation of hypertension to fibroid disease of the uterus? From a study of 416 patients suffering from fibroids, the authors conclude that these tumours have no effect upon the blood-pressure of young women, and that those who do have increased tension are usually over forty years of age, or are the subjects of cardiac or renal disease. The bleeding has no effect upon the pressure, but, when suddenly checked by operation or radium, the tension is often temporarily increased. Conservation of the ovaries secures a less tumultuous post-operative climateric. Finally they are of opinion that the increase of both blood-pressure and of nervous phenomena are more pronounced after radium than after operation.

A review of one hundred cases of women with pelvic tuberculosis, with special reference to the end results of operative treatment. The primary mortality in this series was seven per cent. Sixteen died later but only nine of these deaths were from tuberculosis in any form. It is interesting to note that seven of these nine patients who died later of tuberculosis had positive chest findings at the time of the operation. The importance of pulmonary tuberculosis is further emphasized by the fact that twenty-five per cent. of the total number of patients had phthisis.

Peterson was able to trace the after-histories of all but two of the remaining seventy-seven patients. Seventy-three of these were well and only two were reported to be in bad health.

A detailed analysis of forty-four specimens of bilateral tubo-ovarian disease in which hysterectomy had been performed showed microscopic evidence of tuberculosis in forty per cent. of the ovaries, in fifty per cent. of the uteri, and in eighty-six per cent. of the tubes. These figures are held to support radical operative treatment, which the author appears to recommend in practically all cases of pelvic tuberculosis.

A study of adeno-carcinoma of the fundus of the uterus. This analysis of forty-four cases of adenocarcinoma of the corpus uteri should help to correct some oft-quoted, but inaccurate, statements about the incidence of the disease. The average age was found to be fifty years, but fifteen of the patients were under this age, and the youngest of these was only thirty-five. The author also shows that the disease is *more common* in women who have borne children than in the nulliparous. Bleeding and foul or irritating discharge were the commonest symptoms. Pain was inconstant, and loss of weight occurred in but eight of the forty-four women. Seven were actually gaining weight. The average duration was one year and eight months.

Sixty-five per cent. were alive and well five or more years after operation. The primary mortality was seven per cent.

It is surprising to find that the percentage of recurrence was about the same, whether the uterus was removed by supravaginal or by total hysterectomy. Panhysterectomy is, however, the operation wheih the author advises; and he is sufficiently advanced not to recommend the Wertheim technique. Secondary deposits were found in the tubes or ovaries in eleven per cent. of the cases in this series so that thir removal is always indicated.

The differential histological diagnosis is discussed at some length but without adding any new factors to our present knowledge.

Report of a case of intractable vulvar ulcer (esthiomene) cured by proteus vaccines. A chronic spreading ulcer had been present on the vulva for five years and had resisted all manner of treatments including cautery and excision. The Wassermann was negative. A pathological report is given upon a portion of the excised tissue, but no mention is made of evidence of tubercular disease, so perhaps it may be taken that none was present. Various organisms were found in cultures at different times, but it was decided that the proteus was pathogenic and a vaccine was prepared. The ulcers healed in a month. The author does not explain why he uses the term " esthiomene " for a non-syphilitic lesion.

W. W. KING.

Bulletin de la Societe d'Obstétrique et de Gynécologie de Paris, etc.

LA SOCIETE D'OBSTETRIQUE ET GYNÆCOLOGY DE PARIS.

13th February, 1922.

*Failure of treatment by blood serum in a case of pernicious vomiting. VAUDESCAL.

Some notes on Cæsarean section employing the lower uterine segment. BRINDEAU.

Myomectomy and pregnancy. DEVRAIGNE and RAVINA.

An apparatus for oscultation during confinement. VIGNES.

Drainage of hæmatoma in a partial rupture of the uterus. LANTUEJOUL and WALTER.

*Rupture of a Cæsarean scar during a subsequent pregnancy. CLEISZ.

Special instrument for inducing labour. GUILLERMIN.

Complete retroversion of a gravid uterus at term. POTOCKI.

Failure of treatment by blood serum in a case of pernicious vomiting. The success attending the treatment of a case of ptyalism in the course of pregnancy by a single dose of serum from the patient herself induced the author to try the same treatment in a case of pernicious vomiting. The patient selected was a woman 26 years of age, pregnant for the second time, with a past history of chorea and scarlet fever. She started vomiting six weeks after the commencement of pregnancy, and treatment was started about three weeks later. Many forms of treatment were tried and eventually 10 cm. of her own blood was taken and citrated and at once injected subcutaneously into the thigh. The treatment did not relieve the patient at all, and labour had to be induced.

Rupture of Cæsarean scar during a subsequent pregnancy. The patient, aged 33, had had Cæsarean section performed ten years previously. The uterus was said to have been sutured with chromized catgut. After the operation the patient had slight temperature for about two weeks. In the second pregnancy, when first seen, the fœtus was found to be almost transverse. A few days after admission patient got out of bed, and suddenly had extremely violent pain in the abdomen. She got back to bed with difficulty, and on examination was found to be suffering from shock. The abdomen was tender and rigid; fœtal heart could not be heard, and a diagnosis of rupture was made. On opening the abdomen much clot was found and the omentum very adherent to the uterus. The uterus was opened and a living child delivered. Hysterectomy was performed, and the patient recovered. The author discusses the question of how such a rupture was produced before labour started, and suggests: (1) that it might be due to contraction of the bowel pulling on the uterus by the adhesions of the omentum; (2) that it might be due to the catgut which was used at the time of the first labour; (3) might not the ergotin, so often employed during Cæsarean section, have loosened the catgut sutures?

13th March, 1922.

Influence of perineorrhaphy on conception. SEJOURNET.

Therapeutic treatment of pernicious vomiting. WALLICHI.

"Urinary syndrome" in pernicious vomiting. LAUDAT.

Instrument for the certain diagnosis of twins by oscultation. THIERRY.

Intestinal obstruction due to fibroids in a patient 3½ months' pregnant. LOUIR and DUCHENE.

*Pregnancy occurring during X-ray treatment for fibromyomata. LOUIR and DUCHENE.

Enucleation of fibroids followed by full-time pregnancy. DIDIER and HIDDEN.

Summary of antisyphilitic treatment at the Baudelocque Clinic, 1921. COUVELAIRE.

Pregnancy occurring during X-ray treatment for fibromyomata The authors report on the case of a patient aged 34, who had had two children. Her menstruation was regular until December, 1920, when she began to suffer from menorrhagia. On examination she was found to have a large fibromyoma extending 18 cm. above the pubis. The first dose of X-ray was

given on the 7th February, 1921. The dose was ¼ H. filtered with 5 mm. aluminium, with a spark gap of 19 cm. 24 from the anti-cathode to the skin. After three treatments patient ceased to have bleeding; after the sixth dose the fibroid had obviously diminished and reached just below the umbilicus. After ten treatments the patient was obviously better and the periods did not reappear. Two months later she complained that her abdomen was getting larger. On examination in June, *i.e.*, four months after treatment had commenced, it was found that the uterus was enlarged to the size of a five months' pregnancy, and the fœtal heart could be definitely heard. On October 17th a Cæsarean section was performed, as the patient had obstructed labour due to the fibroid. A full-time child was delivered and three fibroids were enucleated.

SOCIETE D'OBSTETRIQUE ET DE GYNÆCOLOGIE DE BORDEAUX.

24th January, 1922.

Rupture of ectopic gestation necessitating immediate operation. BEGOUIN.
*Pain in the cervical stump following subtotal hysterectomy. DUVERGEY.

Pain in the cervical stump following subtotal hysterectomy. The following case was brought forward as being a rare sequel of a subtotal hysterectomy. The patient, aged 32, suffered for many years from metritis and salpingo-oöphoritis, and in June 1920 had a subtotal hysterectomy. After leaving hospital she had a certain amount of white discharge, and constant pain at the pit of the stomach in the middle line, and on the right side, necessitating her resting in bed from time to time. In July 1921, the pain became so great that she decided to seek further advice. It was found on examination that the cervix was very hard, sclerosed, and extremely tender. The cervix was, therefore, excised completely on September 3rd. On section it was found to have fibrous nodules and an inflammatory condition of the cervical mucous membrane.

14th February, 1922.

Puerperal septic peritonitis. PERY, COURBIN and PAUZATS.
Severe puerperal metritis, ending in death. PERY and COURBIN.
*Indications for hysterectomy in puerperal infection. COURBIN.
Cæsarean section in a case of contracted pelvis with a recto-vaginal fistula from a previous confinement. MAURICE RIVIERE and BOURSIER.

Indications for hysterectomy in puerperal infection. M. Courbin found it difficult, if not impossible, to be precise as to indications, but considered that it might be justifiable in the two following classes of case: (1) in severe lesions of the uterus, such as perforation, gangrene or multiple abscesses; (2) septic puerperal peritonitis when localized to pelvis. He considered that to be of value the hysterectomy must be done early, but at this period it is impossible to say what the course of the disease will be. He does not consider that the temperature, nor pulse, nor rigors, nor duration of the infection are in themselves a certain guide as to the course of the disease. He prefers to be guided by the look of the patient, the character of the lochia, the state of involution of the uterus and its consistency, and the blood pressure.

SOCIETE D'OBSTETRIQUE ET DE GYNÆCOLOGIE DE MONTPELLIER.

1st February, 1922.

Cystic teratoma in the ilio-lumbar region. GODLEWSKI and GRIMAUD.

*Cæsarean section in a case of deformed pelvis due to lumbar-sacral kyphosis. VALLOIS.

Cæsarean section followed by subtotal hysterectomy in a case of stenosis of vagina. DEVEZE.

Cystic sarcoma of the uterus. TEDENAT.

Beneficial result of induced abortion in a case of rapid consumption. VALLOIS and ROUME.

Retroplacental hæmatoma. DELMAS.

Cæsarean section followed by subtotal hysterectomy in a case of stenosis. M. Deveze reports the following case: a Spanish patient, 35 years of age, had a history of dysmenorrhœa and dysparunia following a difficult labour two years previously. On examination the vagina was found to be very short, the vault of it was a small opening leading to a second cavity in which the cervix was situated. An operation was performed in January 1920, the anterior and posterior vaginal walls being incised. A year later Cæsarean section was performed and following this a rapid hysterectomy. Patient made recovery. M. Deveze states he did the hysterectomy because he feared there might not be sufficient drainage through the vagina for the lochia, and that it might lead to sepsis.

SOCIETE D'OBSTETRIQUE ET DE GYNÆCOLOGIE DE NANCY.

Vaginal myomectomy. DELFOURD.

Large ovarian cyst in a girl of 13. HAMANT.

Streptococcal septicæmia with multiple hæmorrhages. HAMANT and MATHIEU.

Case of chorea complicating pregnancy. FRUHINSHOLZ.

M. DONALDSON.

Acta Gynecologica Scandinavica.

Vol. i, Fasc. 1, Uppsala, 1921.

*Some remarks on the treatment of placenta prævia. ELIS ESSEN-MOLLER.

*A new method for the application of the upper blade of the forceps in transverse presentations. CHR. LANGE-NIELSEN.

*Chorioepithelioma malignum. ANTON SUNDE.

The extension of the Wolffian body with particular reference to the genesis of von Recklingshausen's tumour. HJ. FORSSNER.

*Two cases of fibromyoma with intra-abdominal hæmorrhage. P. ERNST and S. A. GAMMELTOFT.

*Proceedings of the Obstetric-Gynæcological Section in Stockholm, October 22nd, 1920.

Some remarks on the treatment of placenta prævia. The author bases his remarks on his personal observations of the treatment of 132 cases of placenta prævia during a period of twenty years with a maternal mortality of 3.7 per cent., and a fœtal mortality of 45.6 per cent. This maternal and

fœtal mortality rate includes those cases where the mother was admitted to the hospital in a dying condition, and in which treatment was unable to save her life; also cases where the child was dead before the accouchement, dying during the accouchement or dying after its birth while the mother was still in the hospital.

The different procedures employed in the treatment of the 132 cases were as follows :—

Natural labour.—22 cases. Maternity mortality nil; fœtal mortality 36.3 per cent.

Rupture of the membrane (only).—33 cases. Maternal mortality nil; fœtal mortality 28.4 per cent. (one birth twins); deducting premature infants of less than 2,000 grammes the mortality has been 23.3 per cent.

Rupture of the membranes followed by forceps.—2 cases. One child living, one dead.

Version (after Braxton Hicks).—51 cases. Two of the mothers succumbed but both were dead before admittance to hospital. Fœtal mortality 69.8 per cent; after deduction of prematures 61.9 per cent.

Vaginal tamponnage.—8 cases (6 before admittance to hospital). The author condemns this procedure as dangerous.

Bringing down a foot in breech cases.—4 cases. One fœtus dead.

Abdominal Cæsarean section.—7 cases. One mother succumbed to pulmonary embolism: of the infants two succumbed—one being dead before the operation, the other was premature and survived only one hour.

Vaginal Cæsarean section.—12 cases. Maternal and fœtal mortality nil. In seven of the cases the operation was alone practised; in three others it was performed after version, perforation of the membranes and version with "procidence du cordon."

The author's conclusions as to the best treatment of placenta prævia may be summed up as follows :—

(1) The admission of the patient to a special clinique or maternity hospital as soon as possible after the first hæmorrhage has occurred.

(2) The recourse to surgical procedures which, while safeguarding the mother, render possible the immediate extraction of the child.

(3) Vaginal Cæsarean section (with incision always of the anterior uterine wall) is to be preferred to the abdominal route.

(4) It appears prudent to perform version prior to the operation.

(5) Cases of placenta prævia come into the category of such grave complications as eclampsia, rupture of the uterus, etc., conditions in which hospital treatment gives better results than home treatment. "The more cases that will be treated in hospital, and before the patient has lost much blood, so much better will the results be, both for the mother as well as for the child."

A new method for the application of the upper blade of the forceps in transverse presentation. Instead of passing the forceps blade over the sinciput with the concave rim pointing to the front the author passes it over the occiput with the convex rim directed to the front. After this method the forceps can be more easily applied as the blade passes more easily over the occiput than over the brow.

The application is carried out as follows :—One takes the upper blade in the right hand and the fingers of the left hand are passed into the vagina; the forceps blade being held level with the handle near the buttocks

of the patient it is passed partly into the right side of the pelvis over the occiput of the child : then it is turned by depressing the handle on the front lateral surface of the head, and is then passed somewhat beyond the median line, so that it lies behind the ear of the child. The lower blade is then passed directly behind the head into the pelvis to the right of the upper blade.

If the head lies deep in the pelvis it is at once rotated without simultaneous traction, and the extraction follows as in the ordinary occiput position. If the head does not lie deep in the pelvis it must be extracted before the rotation follows.

When the sagittal suture lies in the false oblique diameter, the method is an easy one, and it is ideal in face presentations with the face line in or almost in the transverse diameter of the pelvis.

The method is less to be recommended in cases of narrow pelves and increased flexion of the head.

Chorioepithelioma malignum. Clinical and pathological studies. With a contribution towards illuminating the transition of hydatid mole to chorioepithelioma.

In this paper the authors opens with a brief historical review of chorioepithelioma, and then proceeds to give a brief summary of 38 cases which have come under his personal care.

Of these 38 cases 26 *were lethal* : after hydatid mole 10 cases; after abortion seven cases; after normal labour eight cases (two of which were ectopic chorioepitheliomas); after ovarian pregnancy one case.

Twelve cases were cured : after hydatid mole 11 cases (one being an ectopic chorioepithelioma; after abortion one case.

Critical investigation of the questions discussed in recent years with reference to the author's own research :—

Name.—Chorioepithelioma is the best, as it indicates what the tumour consists of and its nature.

Etiology and Pathogenesis.—The real cause still unknown. *Age* : From 20 to 30 years the absolute number of cases of hydatid mole and chorioepithelioma is greatest; at the age of 40 and upwards the largest number of such cases are found in proportion to the number of conceptions, clearly showing the predisposing influence of age in respect to the occurrence of these two diseases respectively.

Of 140 cases of chorioepithelioma, 45 per cent. have been vi-para or more, whilst only 23 per cent. of 56,397 mothers with normal pregnancies have had the same number of children; from this it appears that repeated pregnancies predispose the mother to the disease. The author found that chorioepithelioma proceeded from hydatid mole in 43.6 per cent. of 140 cases.

Symptoms.—The first, chief, and very constant is hæmorrhage, irregular or more continuous with a fetid, sanious and often purulent discharge. Symptoms of infection are eminently frequent. Ovarian cysts from the frequency of their concomitancy must also be included as a branch of the symptomatology. Symptoms vary considerably, from superadded complications, and particularly in cases of ectopic tumours.

Diagnosis.—All agree it may offer great difficulties : to arrive at it main stress is to be laid on the clinical features, examination (including in all cases intrauterine digital examination), and the microscopic examination of material secured by curettage (it is not very rare that by microscopical

examination we can neither make a positive diagnosis nor exclude the possibility of this tumour).

Therapy.—The sole correct treatment (maintained by the author) is vaginal extirpation of the uterus, its advantages over the abdominal route being (1) superficial narcosis sufficient; (2) operation of short duration; (3) small risk of infection; (4) good drainage facilities. The adnexa (owing to the rare occurrence of their being the site of malignant metastases) should be left intact in young women; in patients near the menopause they may as well be removed along with the uterus. Radium and Röntgen rays are of no avail.

Prognosis.—In the author's series of cases 12 out of 18 operable cases cured, of which 11 cases succeeded hydatid mole, one case abortion. These 12 cases have been under an average observation period of eight years subsequent to the operation.

Spontaneous cure.—These cases, of which scarcely more than two are authentic, are extremely rare, but the author is inclined to assume that such cases can at any rate conceivably be explained as a result of total necrosis of the tumour (this conclusion is based on one of his own cases).

Long period of latency.—The author in his series has two cases with a seven years' period of latency—both died; two cases with a three years' ditto—one died, one cured; and one case with a two years' ditto—cured.

Chorioepithelioma proceeding from an extrauterine pregnancy.—The author has one case in his series following an ovarian pregnancy (died). In 1912 Rossier reports a typical case of chorioepithelioma of the tube—the twelfth of a series amongst 350 uterine chorioepithelioma. No case was cured.

Ectopic chorioepithelioma (Dunger).—The author has three such in his series: (1) Large vaginal tumours and general metastases; (2) Cerebral tumours and general metastases Both occurred after normal birth of living child. Both lethal. (3) Vaginal tumour—after hydatid mole. Cured. Uterus removed along with vaginal tumour. The decision to remove the uterus in such types of case must be a matter of individual judgment.

How often does hydatid mole develop into chorioepithelioma?—Opinions are very contradictory in the literature on this subject. The author collected 240 cases of hydatid mole from all the gynæcological clinics and maternity sections of Stockholm, Upsala, Kristiania, and the bulk of the cases at the disposal of the Norwegian midwives. Five years was selected as the minimum period of observation. 122 of the 240 have been under an average observation of 11½ years and of these 122 only six had chorioepithelioma after hydatid mole (5 per cent.). Forty-two of the 122 cases are clinical material, the other 80 are from the practice of midwives.

Two cases of fibromyoma with intra-abdominal hæmorrhage. Both the cases deal with patients with fibromyoma, which is complicated by a subperitoneal vein being ruptured, and causing serious hæmorrhage. In one case the hæmorrhage is in direct conjunction with serious trauma (knocked down by a woman on the pavement getting off a tram). In the second case there are points permitting of a traumatic origin being advanced, the primary symptoms developing in conjunction with a bodily strain. Thirty-three such cases (including the present-mentioned two) are mentioned in the literature, but not in all can it be established that a hæmorrhage from a ruptured vein has been the factor. There are 23 of the 32 (including the present-mentioned two) authentic cases.

Age of patients.—1—51 years; 9—51.50 years; 11—31.40 years; 1—30 years; 1—under 30 years. Of the 23 cases, six are mentioned where both fibroids and pregnancy are found (Gammeltoft's case is one of these six). Of the 23 cases, in only two can trauma not be assigned as the cause of the rupture. In 11 cases, the tumour lay in the posterior part of the uterus, and the ruptured vein was on the posterior surface of the tumour.

Mortality.—Five cases ended fatally.

Prognosis.—The authors conclude that this may be said to be relatively good conditional on early operation.

Diagnosis.—Only in the minority has it been possible to diagnose correctly: most cases are diagnosed as torsion or rupture of ovarian cyst, ruptured ectopic pregnancy, perforated gastric or duodenal ulcer, or internal bleeding.

Treatment.—Laparotomy with subsequent supra-vaginal hysterectomy, enucleation, or ligature of bleeding vessels.

It is to be emphasized that patients who have fibroids, and who suddenly show signs of intra-abdominal bleeding, a search should be made in the anamnesis for trauma, as this will support the diagnosis.

Finally, it must be emphasized that the knowledge of these cases of hæmorrhage and their ætiology warns us to avoid manipulations of the fibroid uterus whether it be reposition of the incarcerated fibroma during labour, expression ad. mod. Credé, or energetic palpation, or massage for a diagnostic or therapeutic purpose.

Proceedings of the Obstetric-Gynæcological Section in Stockholm, Oct. 22, 1920.

Two cases of uterine tuberculosis. Professor Hj. Forssner.

Both these cases deal with young virgins who had shown no other symptoms than fairly insignificant discharge. On examination in both cases there were a cluster of long luxuriant polypi embedded in a profuse limpid viscid mucus in the neighbourhood of the external os; in one case there was a defect in the cervical tissue, in the other there was not. In both cases the polypi started from a tuberculous base, but had no specific characters in themselves. In both cases there was no sign of any other pathological condition in the genitals or otherwise. In one case a salpingitis appeared 2½ months later; in the other case the patient has worked for four months subsequent to the operation without any symptoms of salpingitis showing. Neither of the cases had tuberculosis of the urinary passages. In both cases the endometrium was infected. The author inclines to the view that these are two cases of primary uterine tuberculosis.

Differential diagnosis.—Cancer or possibly sarcoma—settled by histological examination.

Treatment.—Case 1: scraping with spoon and then Paqulin of the seat of the disease; patient healed quickly. Case 2: scraping and Paqulin of cervical canal and an exploratory scraping of body of uterus (T.B. endometritis +). Endometrium afterwards occasionally treated with H_2O_2 and iodine. Healing proceeded normally.

A case of bilateral extrauterine pregnancy. Dr. Nu Wetterdal.

A case of tubal abortion in the left tube evidently occurring during the summer of 1919. In November the egg had died, and the patient then recovered from repeated fainting attacks and indispositions, representing the intraperitoneal hæmorrhages caused by the gradual process of birth. In the summer of 1920 there is then a pregnancy in the right tube which is

ended by a rupture. At operation a fœtus, 3 cm. long, was found, evidently ejected from the right tube. A 9 cm. long fœtus was also found in a mass adherent to the left adnexæ and lateral pelvic wall—the first tubal pregnancy.

A case of rupture uteri intra gravidatem. Dr. SVEN HASSELROT.

Patient unmarried, 32 years of age, bi-para—both abortions. Last menstruation in July 1919. On March 17th, 1920, while cycling uphill suddenly felt intense pain in lower abdomen. During following days severe abdominal pains, gradual abdominal distension, vomiting, sparse hæmorrhage. Admitted to hospital on 25th March. Temperature 38.6° C., pulse 120; complaint, severe pains in stomach. Examination: abdomen distended, very tender, hympanitis, resistance felt arising from pelvis with an indication of small parts in it. No fœtal sounds heard. Vaginal examination: portio preserved and softened. External os admitted one finger as did cervical canal up to internal os. No fœtal parts or bag of membranes palpable. Slight bleeding.

Operation revealed a partly contracted uterus with a rupture on its front wall, 12.5 cm. long on serosal surface, 9 cm. on mucosal. The dead fœtus (46 cm. long) was thrust out from the rupture enclosed in the intact membranes. The placenta was on left wall of uterus and its anterior edge was partly torn. Supravaginal amputation of uterus was performed. Post-operative progress was very favourable; recovery ensued after 26 days. Examination of uterus showed no noteworthy defects macro- or microscopically.

The rupture was presumably due to trauma during cycling.

P. A. BENNETT CLARK.

Surgery, Gynæcology and Obstetrics.

Vol. xxxv, No. 4, *October*, 1922.

*Uterus septus duplex, with full-term twin pregnancy. C. J. KIRKHAM.
*Uterus duplex bicornis. Y. WARDLOW and W. P. SMITH.
*Radium treatment of uterine fibroids (editorial). T. J. WATKINS.
Intra-abdominal and intravisceral pressure (editorial). R. C. COFFEY.

Uterus septus duplex, with full-term twin pregnancy. Kirkham operated on a primipara, aged 30, for toxæmia of pregnancy with impending convulsions. After incising the uterus and delivering the child it was noticed that the uterus did not collapse as normally after delivery of contents, and exploration showed the uterus to be enlarged to right of present uterine cavity to about the size of the full-term pregnant uterus. This was thought to be a large fibroid. Incision opened into a cavity and membranes presented. They were ruptured and a second child was delivered. Examination showed a septum half an inch thick running from fundus through cervix and completing dividing uterus into two distinct halves, though externally no point of division was noticeable. The second uterine cavity was sutured in layers without disturbing septum. Patient made a good operative recovery but died on the eleventh day of convulsions of the uræmic type.

Uterus duplex bicornis. The authors describe two cases of this condition and consider that :—

1. Malformations of the uterus are not uncommon, but relatively few in number are recognized.

2. Pregnancy may occur in both horns of a uterus bicornis.

3. Menstruation may occur during pregnancy of a bicornuate uterus.

4. Statistics show frequent occurrence of twin pregnancy in this type of uterus.

5. Malformations of the pelvis may or may not exist with anomalies of the uterus.

6. Reports of uterine malformations should give complete history of menstrual function.

7. Malformations of the uterus are frequently confused in diagnosing pelvic and abdominal lesions.

8. When doing a hysterectomy in malformations of the uterus always be careful to avoid injury of a misplaced ureter.

9. The rectovesical ligament is confusing when first encountered.

Radium treatment for uterine fibroids. Watkins discusses the radium treatment for uterine fibroids in a short editorial and claims that experience has established the fact that radium is the best known remedy for selected cases of uterine fibroid. One thousand two hundred to one thousand eight hundred millicuries (milligram-hours) of radium element, thickly screened, is advised. The radium should be placed within the cavity of the uterus. Atrophy of the tumour commences about the eighth week. Intramural fibroids are best suited for this treatment. Intra-abdominal complications, especially chronic infections, indicate surgical treatment. The objection to the use of radium in large tumours is chiefly the danger of mistakes in diagnosis. Success in radium treatment necessitates the production of a permanent menopause. In younger women it is preferable to remove the fibroid growth rather than to destroy the ovarian functions by radium. The limitations to the use of radium may be extended in cases of poor surgical risk.

Vol. xxxv, No. 5, *November*, 1922.

*Ovarian transplantation. F. H. MARTIN.

Tripartite cliff palate and double hare-lip in "identical" twins. A. D. DAVIS.

Supernumerary kidney with ureter opening into vagina. A. SAMUELS, H. KERN and L. SACHS.

Syphilis of the uterus. J. C. SOSNOWSKI.

*A study of the maternal deaths among ten thousand parturient women at the Chicago Lying-in Hospital. J. P. GREENHILL.

*A report on five unusual cases of hypertension in pregnancy. A. C. WILLIAMSON.

*Radium *versus* operative treatment of fibroids. N. S. HEANEY.

*The diagnosis and clinical aspects of gonorrhœal salpingitis. H. SCHMITZ.

*Short umbilical cord. O. H. ROHRLACK.

*Benzl succinate in dysmenorrhœa. J. J. MUNDELL.

Harmful use of cathartics after abdominal operations. LE R. LONG.

Ovarian transplantation. Martin deals with this under four headings :

I. Brief abstract of articles published in 1917 to 1921 inclusive.

II. Summary of abstracts arranged by subjects as follows :—(1) Indications for transplantation; (2) Influence of oöphorectomy upon the uterus; (3) Transplantation with uterus *in situ;* (4) Transplantation after hysterectomy; (5) Sites for transplantation; (6) Autoplastic transplantation; (7) Homoplastic transplantation; (8) Heteroplastic transplantation; (9) Results following autografts and somografts; and (10) Microscopical changes in ovarian grafts.

III. The author's conclusions which may be summarised as follows :—

(1) Clinically there is little to encourage one to believe that transplantation of ovaries has more than speculative value as a surgical procedure.

(2) There is some evidence that autotransplants are of some value in deferring the symptoms of the menopause and delaying the cessation of menstruation. It is difficult not to attribute some of this evidence to suggestive therapeutics or to unattached ovarian tissue left *in situ.*

(3) There is practically no convincing evidence that homotransplants have been successful in the human female.

(4) There is no evidence that heterotransplants have been successful in the human female.

(5) There is some encouraging evidence recorded in experimental animal surgery that not only autotransplants but homotransplants, and even heterotransplants, have been successful and the sexual function of the castrated animal maintained.

(6) The technique followed by the various operators on human females, in too many instances, seems unsurgical and is often incompletely and loosely recorded, leaving the impression that the conclusions derived from such work must be unreliable.

(7) There is encouraging evidence to lead one to hope that the subject will be pursued experimentally, especially for the purpose of devising a rational and simple technique, based on the work of the serologists, the endocrinologists, the hæmatologists and the practical clinical surgeons.

IV. Bibliography, comprising 147 references.

A study of the maternal deaths among ten thousand parturient women at the Chicago Lying-in Hospital. These 10,000 patients were admitted from Nov. 1, 1914, to Oct. 1, 1921, during which time there were 39 deaths—a gross mortality of 0.39 per cent. For details the original paper should be consulted.

A report of five unusual cases of hypertension in pregnancy. Williamson records five cases of pregnancy in women under 30 years of age with a minimum systolic pressure of 180 to 240 pre-natally, and a pressure of 170 to 240 post partum,—all with uneventful histories. He draws the following conclusions :—

(1) Hypertension may exist throughout pregnancy with no apparent sign of kidney lesion.

(2) Some cases of hypertension in pregnancy may be carried through to a successful termination with careful watching.

(3) Cases in pregnancy with hypertension without demonstrable kidney lesions are probably of vascular origin.

(4) The most likely cause of such hypertension is that it is of toxic origin with the primary action taking place directly in the arterial wall.

(5) The prognosis of such cases is always grave and doubtful both for

immediate and subsequent life and the patient should appreciate fully the import of hypertension.

Radium versus operative treatment of fibroids. Heaney states that there is a growing impression that all cases of fibromyomata of the uterus should be treated with radium. During the period, however, in which he performed his last 100 operations he administered radium only to eight cases of fibromyoma. He is of opinion, therefore, that surgery should be used in the largest proportion of cases needing treatment, while radium should be used only in a small proportion of cases and those should be well selected.

The diagnostic and clinical aspects of gonorrhœal salpingitis. Schmitz discusses the subject of gonorrhœal salpingitis in a general manner and draws the following conclusions :—

(1) Gonorrhœal infections of the female genital tract must be actively treated.

(2) The diagnosis and prognosis of the course of the infection are solely based upon the repeated microscopic examination of stained smears obtained from the urethra, Skene's ducts, the vulvo-vaginal glands, and the cervical canal, and upon the bimanual palpatory findings considering the course of the tubal infection.

(3) The primary gonorrhœal tubal infection is treated conservatively by rest in bed, proper diet, local applications of ice and, later, heat.

(4) Infections of the endometrium, the cervix and the vulva are treated by the measures described.

(5) Repeated attacks or mixed infections that render the patient a chronic invalid are subjected to surgery.

(7) Abscesses opening into the vaginal fornix are opened and drained through a posterior colpotomy.

(8) If ovarian tissue can be left behind, salpingectomy with V-shaped excision of the interstitial portion of the tube is practical; otherwise a total hysterectomy is advised.

Short umbilical cord. Rohrlack discusses this subject at length and draws the following conclusions :—

(1) Relatively short cords are frequently found.

(2) A cord coiled about the neck of the baby rarely produces symptoms unless it becomes relatively shortened due to such coiling.

(3) A comparatively low position of the head is frequently found in short cord cases.

(4) The points upon which a diagnosis can be made are variability in the heart tones of the fœtus combined with a variation in the forces of labour, presentation, position and station of the passenger, and the slow dilatation of the passages.

(5) Prognosis improves with diagnosis and treatment.

Benzyl succinate in dysmenorrhœa. Mundell treats dysmenorrhœa by the administration of two 5-grains benzyl succinate tablets every hour until relief is obtained. He has analyzed the results obtained in 80 cases so treated, but does not appear to be greatly impressed by the results, for he considers that " benzyl succinate will not cure dysmenorrhœa, but that it relieves the pain and cramps equally as well and probably much better than any other drug or method of treatment of which we are conversant to-day."

F. E. T.

Lancet.

October 7, 1922.

Remarks on the scope and technique of myomectomy. V. BONNEY.

The effect of position in the family on the health of the child. R. H. VENCOE.

*A study in the diagnosis of cancer by means of serum reactions. J. A. SHAW-MACKENZIE.

A study in the diagnosis of cancer by means of serum reactions. This paper draws attention to a new test of cancer by means of a turbidity reaction in the serum. It consists in adding an ether extract of cancer tissue, with or without saponification, to cancer serum. This is followed by an appearance of turbidity after incubation which does not appear at all, or not to the same extent, with non-cancerous serum.

October 28, 1922.

An improved axis-traction lever. E. W. W. FARMER.

Chronic endocervicitis and its treatment (correspondence). J. JOHNSTON ABRAHAM.

The *Bacillus abortus* and human abortion (correspondence). S. G. MOORE.

November 4, 1922.

*Observations on temperature and other changes in women during the menstrual cycle. W. C. CULLIS, E. M. OPPENHEIMER and M. ROSS-JOHNSTON.

*A note on variations of blood-pressure during menstruation. S. E. AMOS.

*A note on the " ammonia co-efficient " during menstruation. M. BOND.

Antidote to the toxic effects of excess protein diet during lactation. G. A. HARTWELL.

Chronic endocervicitis and its treatment (correspondence). A. SAVILL and J. W. BURNS.

Observations on temperature and other changes in menstruation. A specially selected group of healthy women medical students were asked to undertake the keeping of daily records of temperature, pulse and blood pressure for some months. A correlation of the results obtained showed rhythmic variations in temperature and pulse, but no definite variations were found in blood pressure variations—though possibly the observations were not sufficiently extended to justify any definite conclusions.

A note of variations of blood-pressure during menstruation. Amos's observations were made on twelve patients at the Frimley Sanatorium performing light gardening work, the blood-pressure determinations being taken at noon each day, just before the rest hour. He found that early in the menstrual period there is a fall of pressure, often preceded a day or so before the commencement of the period by a rise, and that after a rather sudden fall there is again a rise towards the end of menstruation, or a day or so after the period has finished.

A note on the "ammonia co-efficient" in menstruation. Bond found a marked rise in the ammonia co-efficient of the urine in the seven days previous to the period, due to a rise in total output of urinary nitrogen.

November 11, 1922.

*An address on the maternal mortality of childbearing; its causes and how to deal with them. T. W. EDEN.

*The influence of saturnine compounds on cell growth with special reference to the treatment of malignant neoplasms. W. BLAIR BELL.

The menstrual cycle and the calcium content of the blood (correspondence). S. T. WIDDOWS.

The *Bacillus abortus* and human abortion (correspondence). A. BARWISE.

November 18, 1922.

The menstrual cycle and the calcium content of the blood (correspondence). M. C. STOPES.

Maternal mortality of childbearing. Eden points out that in 1920, 5,143 women, six of every seven of whom were under 35 years of age, died in the United Kingdom from causes incidental to childbearing, and that although during the last 20 years there has been great progress made in the elimination of septic complications from all branches of surgical work, the most recent tendency of the mortality-rate from sepsis in childbearing is to rise, rather than to fall.

With regard to the " mortality of pregnancy " he points out that the rate for Ireland is little more than half that for Scotland and considerably lower than that for England and Wales—a result which cannot be due to intensive antenatal work as antenatal clinics are unknown outside Dublin and Belfast. Nevertheless he advocates more effective antenatal supervision and considers that we owe three duties to every expectant mother who entrusts herself to our care, viz.: (1) frequent and regular examination of the urine; (2) a detailed obstetric examination of every primigravida in the early months; and (3) a detailed obstetric examination of every case in the last fortnight of pregnancy, primigravida and multigravida alike. The prevention of difficulty before labour is much simpler than to escape from difficulties which have been overlooked till labour is advanced.

Eden lays down three principles on which the conduct of normal labour should be based, viz.: (1) careful examination of the patient before labour; (2) a simple aseptic technique; (3) avoidance of vaginal examination until expulsive pains occur; and (4) great restraint in resorting to operative delivery.

For the management of complications of labour Eden advocates ample provision for midwifery beds and free use of private consultation in obstetric difficulties, since eclampsia, ante-partum hæmorrhage, obstruction in labour, rupture of uterus, vagina or rectum, and puerperal fever require the best resources of hospital treatment.

Lastly Eden considers that the midwifery work done by doctors is underpaid, and is opposed to the present flat-rate system, and asks if it would not be better to charge a uniform retaining fee to cover the usual supervision during pregnancy and an additional confinement fee to the attendance required and operative work done. He looks to the general practitioner to play the principal rôle in the improvement of midwifery results from whom more will be required in expenditure of time and professional skill, and their reward must be equivalent.

The influence of saturnine compounds in cell-growth.

Prof. Blair Bell was led to contemplate the use of saturnine preparations

in the treatment of malignant neoplasms from the results of experiments concerning the abortefacient action of lead. He found that large doses had a cumulative poisonous effect on embryonic cells—an effect which was most marked in the earlier stages of pregnancy. The other actions of lead on the organism were then considered and this led to the formation of his main argument as follows :—

Phosphatids either in themselves or from their phosphorus content appear to be essential to the development of the nucleus and growth of animal cells, and to the physiological efficiency of important organs. Lecithin is provided by the yolk-sac for the developing embryo and phosphatids are found normally in adult animal cells, being particularly abundant in nervous tissue, in heart muscle, in the suprarenals and pituitary, in the bone marrow and the blood cells and in the sex cells. Hence lipins appear to be of special importance to those tissues in which nervous and growth-producing energies are stored and to those which are characterized by active cell-multiplication and replacement. The changes produced by lead in the organism are probably due to its union with the phosphatids in the cells and therefore this metal may be expected to influence the growth of tumours rich in these substances. Investigations concerning the lipin content of malignant neoplasms show that rapidly growing tumours contain a greater percentage of lecithin than those of slower development, and that sarcomata—which are usually much more quickly growing than carcinomata—contain a much larger quantity of lecithin than that found in carcinomata, but also cerebrosides which are not present in epithelial growths.

This argument is supported by the fact that *in vitro* the metal radicle in lead acetate combines with lecithin forming pansy-like bodies which take up basic stains in a particular manner.

Colloidal combinations of lead have been employed for experimental and therapeutic purposes. Experiments performed on rabbits were chiefly concerned with the effects of lead on the growth of young animals and on the reproductive functions.

Lead poisoning may produce sterility and abortion in the human subject and rabbits, though more immune to lead, eventually suffer in the same way. Abortion is probably produced by its action on embryonic tissues. In the buck rabbit poisoned by inorganic salts of lead, spermatozoa and eventually spermatogonia disappear. Colloid preparations have much less effect.

Therapeutically fifty cases of malignant disease have been treated and the histories of several are given in detail. Four cases are tentatively regarded as cures. There were 21 deaths, 13 within seven weeks after commencing treatment, and eight at a later period.

This experience shows that intravenous injections of colloidal lead, though not without danger, may be regulated so that little or no disturbance results and that after such treatment lead may be recovered from malignant tissues in larger amount than in normal tissues. Lead appears to arrest the growth or to cause the disappearance of the neoplasm, there being also an improvement in the general condition. It is also desirable when possible that the bulk of the growth be removed and that this procedure be immediately followed by the injections. Previous intravenous injections of a colloidal preparation of lead seem to increase the beneficial effects of X-rays, owing to the promotion of secondary radiation.

In the editorial comment on this article in the *Lancet* it is concluded that Prof. Blair Bell has opened up a new line of attack that deserves to be prosecuted. It is also pointed out that "the modern theory of cell-intoxication is that particular orders of cells exhibit a selective affinity for, and absorb, particular molecules, and that, whether by absorption or by chemical union, the presence of certain exogenous molecules arrests the normal metabolism of these cells and so brings about their disintegration. In this way we explain the action of narcotics such as ether and chloroform taken up by tissues and cells rich in fats and lipoids, and the destruction of spirochætes by salvarsan and other arsenical compounds. It is a distinct step forward to attempt to bring about the death of cancer cells by this means. It is possible that future investigations will reveal some agent more specific than lead. But all will recognize the logical sequence of Prof. Blair Bell's investigations." F. E. T.

Archiv für Gynäkologie.

Vol. 116, Heft 1, May 22, 1922.

*Gas gangrene of the uterus (physometra). H. BRUTT.
Surgical treatment of labour in contracted pelvis. A. WOLLNER.
*Teeth in ovarian teratomata. J. STEINHOFF.
*Tests of hepatic function during pregnancy, labour and the puerperium and in eclampsia—a contribution to the study of the "pregnancy liver." R. WALTHARD.
Studies in humoral pathology with reference to the action of colloidal silver (dispargen) and Pregl's iodine solution in puerperal septic conditions. A. MAHNERT and A. SANTNER.
Studies of ovarian hæmatomata. H. RUNGE.
*Aneurisms of the uterine vessels, with reference to an arteriovenous aneurism of the uterine artery and vein following injury by bomb-fragment. E. VOGT.
Can pregnancy last longer than 302 days? E. ZWEIFEL.
The metranoikter as a means of uterine dilatation, and its mode of action. S. STEPHAN.
Cervical torsion of the myomatous uterus. N. ELLERBROEK.

Gas gangrene of the uterus (physometra). Brutt describes six cases of this condition following abortion, all treated by abdominal hysterectomy, with one recovery. For gas gangrene of the uterus he draws the following clinical picture, said to be fairly characteristic:—The patient is restless and much prostrated, with considerable dyspnœa; icterus is present in combination with more or less cyanosis; the blood serum is pigmented; the urine contains hæmoglobin, methæmoglobin or other derivatives; Fraenkel's bacillus is to be found in the lochia or the blood-stream, or both; in combination with pyrexia and signs of peritonitis the uterus is found to be enlarged and frequently gives on palpation a characteristic sense of crepitation.

Teeth in ovarian teratomata. In none of 23 cases in which Steinhoff examined the teeth found in dermoid cysts of the ovary, were teeth noted corresponding to those found on *both* sides of the jaw. The significance of their observation is discussed by the writer and in a note by R. Meyer.

Hepatic function in pregnancy, etc. Walthard employed (1) in pregnant subjects, (2) before, during and after labour, (3) in eclamptic patients after labour the following tests of hepatic function: estimation of the blood sugar during fasting, after intravenous injection of dextrose or lævulose, and after injection of adrenalin chloride; measurement of the urinary urobilin; estimation of the non-protein nitrogen of the blood. He finds that in normal pregnancy there is no evidence of impaired function—the so-called "pregnancy liver": immediately before, during and immediately after labour, however, evidence of altered hepatic function is to be found in (1) hyperglycæmia, (2) diminished hepatic capacity for storing sugar, as shown after intravenous sugar injections, (3) diminished hyperglycæmia following injection of adrenalin. The eclamptic patients showed hyperglycæmia and increase of the non-protein nitrogen of the blood.

Aneurism of the uterine vessels. Vogt has not found in the literature any record of aneurism of the uterine vessels. He describes the case of a iii-para aged 40, who six years after sustaining a penetrating wound of the left buttock by a bomb-fragment complained of severe pain in the lower abdomen and showed profound anæmia combined with nervous symptoms. The periods were regular but somewhat copious. To the left of the uterus was palpable *per vaginam* a tumour of which the internal portion pulsated synchronously with the heart beat and encroached on the lateral vaginal fornix, and the lateral portion, less pulsatile and more constantly tense, could be emptied to some extent by pressure and subsequently filled up again. A systolic bruit was audible over the course of the lower portion of the abdominal aorta, the common iliac artery and the left femoral artery. Normal functioning of the left ureter was demonstrated cystoscopically and operation was preceded by injection of antitetanic serum. Under spinal anæsthesia after ligature of the left internal iliac artery and division of the uterine artery at its origin radical hysterectomy was accompanied by excision of the tumour, which proved to be an arteriovenous aneurism of the uterine vessels ("aneurismal varix"). Splinters of metal were found in the uterus and in the connective tissue adjacent to the aneurism.

W. E. CROWTHER.

Zentralblatt für Gynäkologie.

No. 31, *August 5th.*

On Menge's proposals for new statistics of carcinoma. G. WINTER.
Corpus luteum cysts and corpus luteum persistens. L. FRAENKEL.
The evolution of hysteromyomectomy. D. v. OTT.
A proposal for the enlargement of stenosis vaginæ. H. PETERS.
Experiences with rivanol treatment of mastitis. F. BAECKER.
Operation of a vulva-vagina carcinoma. W. PFEILSTICKER.

No. 32, *August 12th.*

Retrospective view of the Gynæcological Congress. W. ZANGEMEISTER.
On the value of series of cases of carcinoma. O. FRANKL.
*On the function of the liver *sub partu*. B. WALTHARD.
Contribution to the question of endothelium symptoms in obstetrics and gynæcology. K. RUNGE.
*A new method for the provocation of contractions. P. KLEIN.
A contribution to the question of the late reaction after X-ray treatment. M. MAYER.

No. 33, *August 19th.*

*On the therapy of dysmenorrhœa. C. MENGE.
Has the war had a diminishing influence on the operability of carcinoma of the uterus. F. WOLFF.
Ventrofixation of the uterus. R. KASTRUP.
The cause of unappeasable vomiting in pregnancy. H. SCHWAB.

No. 34, *August 26th.*

On the mechanics of labour. A. MULLER.
On varicocele of the ligamentum latum. J. W. MILLER.
Varicocele of the ligamentum latum or varicocele pelvica? F. ENGELMANN.
The troubles in metabolism during pregnancy with special reference to mineral metabolism. P. RISSMANN.
A contribution to the question of rupture of the uterus during labour without apparent cause. W. HOECK.
A new aspirator. V. GOLD.

No. 35, *September 2nd.*

Contribution to the question of contracted pelvis. W. ZANGEMEISTER.
*Pregnancy after bilateral sactosalpinx with Douglas abscess. B. OTTOW.
Perforation of the uterus with severe injury of the adnexa. W. STOECKEL.
*On artificial glycosuria-e-saccharo in pregnancy. W. BAUER.
Inversio uteri puerperalis totalis. C. NEIS.

No. 36, *September 9th.*

Remarks on the interruptions of capillar flow in pregnant women. H. HINZELMANN.
On the meaning of capillar stases. G. LINGENMEIER.
On the influence of the structure of the plasma on cell-life. C. v. OETTINGEN.
The lighting of the operation room. v. SCHUBERT.
*The uterine sound is a dangerous and superfluous instrument. M. HIRSCH.

No. 37, *September 16th.*

Post-operative infusion of salt in the abdominal cavity. A. SIPPEL.
Hæmatoma of the tube with intrauterine pregnancy. N. SCHONHOLZ.
On pain in the shoulder as a symptom of the rupture of extrauterine pregnancy. H. DEWES.
Isolated twisted normal tube. K. W. EUNICKE.
Further contributions to torsion of the adnexa in children. F. SCHEID.
On the question of " reform " in the teaching of obstetrics. H. KRITZLER.

No. 38, *September 23rd.*

The bacteriological indication in the treatment of septic abortion. W. SIGWART.
On the collective statistics of septic abortion. W. SIMON.
On the question of septic abortion. H. STEICHELE.
On negligence in cases of carcinoma. H. KRAMER.
On a case of total prolapsus of rare origin in a nullipara. M. SICHEL.
The Goebell-Stoeckel strips of fascia to strengthen the Schauta-Wertheim operation of prolapsus. W. PFEILSTICKER.
*The action of camphor on the secretion of milk. J. ROSENBLATT.

No. 39, *September 30th.*

Artificial sterilization in sectio Cæsarea with remarks on coitus preservatus medically recommended. H. MARTINS.

*Treatment of sterility by Roentgen rays. G. LINZENMEIER.

Remarks on ileo ischiopagus. R. MEYER.

Lympody and oligohydramnios. H. O. NEUMANN.

*Intracardial adrenalin injection and subcutaneous lobeline injections in the struggle against asphyxia pallida of the new born. F. v. MICULICZ RADECKI.

Melæna in congenital obstruction of the duodenum and mongolism. G. H. SCHNEIDER.

No. 40, *October 7th.*

Hyper-excitability of non-striated muscles of female genital organs. E. OPITZ.

Experiments in the treatment of carcinoma of the collum uteri with X-ray treatment before operation. A. MAYER.

On X-ray treatment as an excitant in hypofunction of the ovary. W. I. FLATAU.

On " vagabundierende " Röntgen rays. F. v. MICULICZ RADECKI.

A further contribution to the formation of a vagina according to Schubert. H. HARTTUNG.

No. 41, *October 14th.*

Salvarsanoxanthema in pregnancy and excitus during the puerperium. F. KIRSTEIN.

Cysts of the corpus luteum and physiological ascites in women. A. MULLER.

On the methods of internal examination. W. TRAUGOTT.

The significance of varicocele in women. G. SCHUBERT.

Fœtal genital bleeding in purpura hæmorrhagica. E. HERMANN.

No. 42, *October 21st.*

Tuberculosis and pregnancy. A. BARTH.

A new stethoscope especially fit for obstetrical practice. J. B. DE LEE.

Bilateral goanal-atresia and obstruction in sucking. E. ELCK.

On the use of the uterus as plastic material in the operation for hernia. A. MAYER.

On the formation of cysts of the placenta. N. ELLENBROCK.

On the sterilization by knotting of the tube. W. S. FLATAU.

No. 43, *October 28th.*

Radical operation of carcinoma of the bladder in women. W. LATZKO.

A contribution to congenital intrathoracal dystopy of the kidneys. F. v. MICULICZ RADECKI.

Contribution to the operative treatment of incontinentia urinæ in women. M. MULLER.

On the value of measurements of the pressure of blood in kidney troubles of pregnancy and labour. W. GESSNER.

On the function of the liver sub partu. The author published the results of his researches in the lying-in hospital in Frankfort concerning the

condition of the liver, shortly before, during and after labour in the *Archiv. für Gynecologie*, vol. 116. He came to these conclusions :—

1. Hyperglycæmia *sub partu*.
2. Probably decreased capacity of fixation of glycose given intravenously.
3. Decreased or lost capacity of mobilisation of glycose after injection of adrenaline.
4. Increased quantity of urobiline.

The author continued these researches in Zurich, and there again he found a hyperglycæmia until the end of the second stage of birth and the impossibility for the liver to fix the glycose administered; consequently a further affirmation of the existence of an injury of the liver *sub partu*.

A new method for the provocation of contractions. The author observes that in cases of feeble contractions, where, for fear of infection, he did rectal examination, he very often saw uterine contractions setting in upon repeated rectal examinations. Of these observations he made practical use in arousing contractions by introducing into the rectum a balloon filled with water (100 à 250 cc.). And in fact after a very short time good contractions set in, which, once automatized, continued also after the removal of the balloon. In this way 30 cases of feeble contractions were treated in the Prague Hospital. The advantages of the method (which the authors calls proktauryse) are especially that the balloon is introduced extragenitally, and that an infection of the genital tract in consequence of the introduction is impossible; that by stretching of the back wall of the vagina the contents of the vagina flow out easily; that the technique is easy, as neither the balloon nor the liquid need be sterile and the doctor need not disinfect his hands; lastly that the women are able to empty the bladder spontaneously.

On the therapy of dysmenorrhœa. For the so-called idiopathic dysmenorrhœa, *i.e.*, the pain during menstruation with normal genital morphology and for the dysmenorrhœa of nulliparæ with a small uterus, Menge has thought out a therapy, founded on his opinion, that the pain arises because, owing to the menstrual swelling of the mucosa, the thick and firm wall of the uterus comes under pressure, a pressure which increases when the bleeding begins. This pressure causes the physiological menstrual and dysmenorrhœal pains. The treatment consists in as ample a dilatation as possible (until Hegar No. 16) and a tamponnade of the entire uterine cavity with xeroform-gauze saturated with oil, which remains for 10 days. With this treatment Menge obtained 80 per cent. permanent cures and improvement in 10 per cent. of the cases.

Pregnancy after bilateral sactosalpinx with Douglas abscess. A woman came in hospital after criminal abortion in the third month of pregnancy a sactosalpinx duplex with perisalpingitis and a big Douglas abscess. The latter was treated with incision, upon which the fever decreased rapidly and the sactosalpinx became smaller. Four months later the woman became pregnant. It was impossible to observe labour, as the woman had moved to another place. Similar cases have been described in the German literature by Gradl (*Zentralbl. f. Gyn.*, 1912) and by Arnold (*Zentralbl. f. Gyn.*, 1922).

On artificial glycosuria e saccharo in pregnancy. The author examined 200 women (120 pregnant in the first three months, 50 pregnant in a later stage, and 30 control cases) with regard to the percentage of sugar in the blood and the presence of sugar in the urine after taking 100 grams of glycose (Frank and Nothmann). He arrives at the conclusion that artificial glycosuria e saccharo as a differential diagnosticum between extra-uterine pregnancy and tumour of the adnexum is impracticable, but that it gives full satisfaction as an early diagnosticum for pregnancy.

The uterine sound is a dangerous and superfluous instrument. The uterine sound is an instrument that many a medical man is very apt to use and that has caused many accidents. The author enumerates the pathological conditions where the instrument is used (to measure the length and define the direction of the uterine cavity in the treatment of abortion and in curettage; to ascertain the contents of the uterus and of the condition of the mucosa; to define deflexions and the movability of the uterus; to raise the retroflected uterus; to distinguish between myoma and tumour ovarii; therapeutically in amenorrhœa, dysmenorrhœa and sterility), and shows that the injury which the instrument may cause is always greater than the advantage, and that in all these pathological conditions the instrument must be considered superfluous. The medical undergraduate as well as the graduate should learn again that one should not penetrate into the uterine cavity without great necessity, and the once living conviction must be resuscitated that uterus, tube and ovary lie deep in the pelvis, surrounded by a bony protection and that they are covered with tender ciliary epithelium, and that only one inflammation caused by a thoughtless treatment may be sufficient to disturb its function and may annihilate the possibility of procreation.

The action of camphor on the secretion of milk. If it is necessary that the mother does not feed her child, that the secretion of milk is brought to a standstill with absolute certainty (1,500 cases!) 0.12 to 0.18 grams of camphor three times a day are administered. per os during 3-5 days. After subcutaneous injection (quantity not given) the reaction sets in even more quickly.

Treatment of sterility by X-rays. Two women, who were treated with small doses of rays, the one for myoma, and the other for menorrhagia, and whose marriage had been sterile for a considerable time, became pregnant after the treatment and gave birth to normal children. The author does not explain his result by the stimulating action of the X-rays, but by a diminution of the cell complexes which, according to the prevalent theory are the bearers of the hormonal action of the ovary. With small doses normal follicles may remain and thus the entire hormonal action of the ovary may be changed.

Intracardial injection of adrenaline and subcutaneous lobeline injection in the struggle against asphyxia pallida of the new-born. Report of the following case: In the treatment of eclampsia the mother got in total 0.03 grams of morphine 0.0003 grams of scopolamine, and as a narcotic for the sectio Cæsarea 210 grams of ether. The child was born badly asphyxiated; the usual methods were of no avail; the heart began to beat irregularly and

there was no respiration. Upon intracardial injection of 0.5 mgr. suprarenine the heart began immediately to beat more quickly and regularly, but respiration could not be roused by the usual measures. This result was, however, obtained immediately after the subcutaneous injection of 3 mgr. of lobeline (the alkaloid of lobelia inflata, which in small doses causes irritation of the respiratory-centre and paralyzing of the end fibres of the n. vagus in lung and heart). Recommendation of this method in serious cases. T. A. WIJSENBEEK.

The following abstracts are reprinted from "MEDICAL SCIENCE: ABSTRACTS AND REVIEWS," by kind permission of the Medical Research Council.

Metastases in irradiated and non-irradiated carcinoma of the neck of the uterus. WERTHEIMER, S. *Sprahlen therapie*, 1921, 12, 90 (*Journ. de radiol. et d'electrol.*, 1922, 6. 48.) Abstract from "Medical Science: Abstracts and Reviews, 1922, vi, 6.

It has been stated that metastases are more frequent in irradiated than in non-irradiated cancers. The question is of great importance, since radiotherapy would be valueless if, at the price of local healing, dissemination were brought about in the neighbouring organs. The author publishes the statistics of 104 cases of carcinoma of the neck of the uterus on which post-mortem examinations have been made and sections examined at the Pathological Institute at Frankfort. Of these cases, out of 250 that died without irradiation, metastases were found in 27, *i.e.*, in 54 per cent., of the 54 cases treated with X-rays or radium or the two combined; 26 showed metastases, *i.e.*, 48.15 per cent. Metastases in the liver appeared to the author to be more frequent: 25.9 per cent. in irradiated and 14 per cent. in non-irradiated cases. The same statistics show that the number of cases of metastases diminishes with the age of the patients. S. E. L.-B.

Nitrogen balance in children and pregnant women. LAUTER, S. *Deutsch. Arch. f. klin. Med.*, 1922, 139, 46. Abstract from "Medical Science: Abstracts and Reviews, 1922, vii, 1.

Nitrogen balance experiments with children and women in pregnancy Lauter finds that the amount of nitrogen necessary to produce a balance in children is low in comparison with their total energy requirements. On the other hand, in pregnant women the ratio is that which is considered to be normal for healthy subjects. C. G. L. W.

The action of salicylates on the uterus. GUNN, J. W. C., and GOLDBERG, M. *Journ. Pharmacol. and Exper. Therap.*, 1922, 19, 207. Abstract from "Medical Science: Abstracts and Reviews, 1922, vii, 1.

It has been suggested that abortion sometimes occurs during the treatment of acute rheumatism with salicylates. It is found that sodium salicylate has a stimulating action on the uterus but only in concentrations higher than those found in the blood during the treatment of rheumatic fever. It is suggested that in these cases the abortion is the result of the fever, and that the salicylates have little effect unless the uterus is especially sensitive.

On the relationship between B. melitensis (Bruce) and B. abortus (Bang). SKARIC, J. *Ztsch. f. Hyg. und Infektionskr.*, 1922, 95, 358. Abstract from "Medical Science: Abstracts and Reviews," 1922, vii, 2.

The author confirms the close relationship between *B. melitensis* and *B. abortus* which has been emphasized particularly by American writers. The action of *B. abortus* in man is still unsettled, and the author thinks that it is not likely to be pathogenic. He cites the case of certain districts in Lower Austria in which cattle abortion was common though there were no reports of any possible action in human beings. The serum of human beings who had drunk the milk of cows suffering from abortion agglutinated *M. Melitensis.* W. B.

The precipitin reaction in the determination of the infectivity of gonorrhœal discharges. KELLEY, MARGARET F. *Journ. Infec. Dis.*, 1922, 30, 623. Abstract from "Medical Science: Abstracts and Reviews.," 1922, vii, 2.

The authoress has tested the statement of Robinson and Meader (1920) that extracts of discharges from gonorrhœal inflammations give precipitin reactions with antigonococcus serum even when smears from such discharges fail to show gonococci. It was found that although reactions occurred with extracts of gonorrhœal discharges in the presence of antigonococcus serum from rabbits, similar reactions were also obtained with normal rabbits' serum. Likewise extracts from non-gonorrhœal discharges gave reactions with normal and immune sera. The authoress concludes that the precipitin reaction as recommended by Robinson and Meader is not applicable for the determination of the presence of gonococcus in the discharges from cervix and urethra. W. B.

Chlorine content of cow's and goat's milk and formulas commonly used in infant feeding. SISSON, W. R., and DENIS, W. *Amer. Journ. Dis. Child.*, 1922, 23, 431. Abstract from "Medical Science: Abstracts and Reviews," 1922, vii, 2.

In 12 Jersey cows producing a relatively small amount of milk with a high fat content, the average chlorine content amounted to 175 mgm. per 100 ccm. and showed remarkably small variations in the different animals. A dose of 500 grammes of salt produced practically no effect on the chlorine content of the milk. In 25 Holsteins, on the other hand, giving a very large yield of milk, the chlorine content varied from 75 to 156 mgm. Formulas used in infant feeding gave chlorine concentrations varying from 42 to 151 mgm. per 100 ccm. as compared with a normal value for human milk of 40 to 60mgm. The authors point out that formulas containing dextri-maltose with added salt may contain 40 per cent. more sodium chloride than human milk, and that pathologic gains in weight may result due to retention of water. O. L.V. DE W.

BOOK REVIEWS.

"The Practitioner's Encyclopædia of Midwifery and the Diseases of Women." Edited by JOHN S. FAIRBAIRN, M.A., B.M., B.Ch. (Oxon.), F.R.C.P. (Lond.), F.R.C.S. (Eng.). Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton, 1921. 950 pages. Price £3 3s.

THE Editor has designed this book with the intention of assisting to close the gap which unfortunately has existed and still exists between the art of midwifery and that of the treatment of the diseases peculiar to women, and his efforts in this direction have been most successful. The Editor, in his introduction, reminds the reader how often in the past it was assumed that it was right and proper to profess a knowledge of gynæcology without any equivalent knowledge of midwifery, and quotes the case of a surgeon who, when applying for a gynæcological appointment, airily boasted that all he had seen of obstetrics was "one abortion and two after-births." Such ideas, however, are anything but ancient, and the modern surgeon, without the knowledge of midwifery that he had and which he forgot soon after passing his final examination is considered by many, and not infrequently by himself, to be a fit and proper person to treat women for the diseases peculiar to their sex because he has attained the manual dexterity to remove an ovarian cyst with a twisted pedicle ." No one who has not been through the obstetric mill in a maternity hospital or general practice can have the judgment demanded by many of the problems presented by the diseases of women."

The Encyclopædia is divided into seven parts.

Part I deals with the Life History of the Female Reproductive Organs, and includes sections on Anatomy, Development and Physiology, by Dr. R. W. Johnstone, Dr. Nepean Longridge, and Mr. T. G. Stevens.

Part II deals with Normal Reproduction, and contains one of the best sections in the book, that on Hygiene and Management, by Dr. J. W. Ballantyne, whilst that by Dr. Haig Ferguson on The Application of Hospital Methods to Private Midwifery Practice is full of sound common sense, very helpful, and does not strive after the unattainable.

Part III is concerned with Abnormal Reproduction and Abnormal Labour. The sections on the Toxæmias of Pregnancy, by the late Mr. Gordon Ley, only serve to emphasize the loss to Obstetrics and Gynæcology by the untimely death of this brilliant young expert. This part also includes General Diseases Complicating Pregnancy, with sections on Syphilis, by Mr. John Adams, Abortion by Mr. Clifford White, and an extremely good article on Ectopic Pregnancy by Dr. Russell Andrews. Ante-partum and Post-partum Hæmorrhage is dealt with, under Abnormal Labour, by Dr. Blacker in the judicial manner which one always expects in his writings. Dr. Robert Jardine, with his unique experience of eclampsia, has contributed an illuminating article on Eclamptic Convulsions, and the sections on the General Considerations of Delayed and Obstructed Labour and the Deformities of the Bony Pelvis by Professor Munro Kerr still further enhance the reputation of this great authority on these subjects. The Editor concludes with a most useful Summary of Abnormal Pregnancy and Labour.

Part IV deals with The Infant, and the Editor has been fortunate to include in

the list of his contributors such an enthusiastic worker and authority as Dr. Eric Pritchard, whose sections on The Physiological Principles underlying Management, Artificial Feeding, Management of Premature Infants and Complications During the First Month of Life, cannot fail to interest the practitioner and be of the greatest service to him in his work.

With Part V commences the second portion of the Encyclopædia, dealing with Diseases of Women. In the first section the Editor contributes most useful articles on the Symptoms Complained of by Patients and their Investigation, Methods of Examination and Observation of the Patient, whilst as an indication of the thoroughness of this book may be mentioned the articles on Bacteriological and other Laboratory Methods, by Dr. W. C. Topley, The Cystoscope, by Mr. Harold Wilson, and X-Rays, by Dr. Robert Knox. The article on Uterine Hæmorrhage in the section dealing with the Disturbances of Function and Symptoms of Disease, by Professor Beckwith Whitehouse, stands out as a masterly exposition. In Section V an article by Professor W. E. Fothergill on Obstetrical and Other Injuries, is very clear and full of sound common sense.

Infections are adequately dealt with in Section VI, by Dr. R. W. Johnstone, Dr. Herbert Williamson, the Editor, Professor Ewen J. Maclean and Dr. Wyatt.

Section VII deals with Overgrowth and New Growth, the authors of which include Mr. T. G. Stevens, Dr. Fletcher Shaw, the Editor, Mr. Willett and Mr. Comyns Berkeley, who contributes the articles on Fibroid Tumours of the Uterus and Malignant Disease.

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As an indication of the forethought of the Editor and the trouble to which he has gone to make the Encyclopædia complete may be mentioned Part VI, which deals with Public Health, Social and Medico-Legal Matters, subjects which one rarely finds in books dealing with midwifery and diseases of women, and yet so important, especially to the practitioner. The sections on The Rôle of Obstetrics in Preventive Medicine, by Dr. Eardley Holland, and on the Industrial Occupations and the Health of Women Workers, by Mrs. Rhoda Adamson, are well worth perusal.

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This Encyclopædia is the best book that we know of dealing as a whole with the subjects of midwifery and diseases of women in all their aspects. The authors include in their number some of the best known authorities in the United Kingdom on the subjects upon which they write, and it would be extremely difficult for a practitioner seeking for guidance in some obstetric or gynæcological case, not to find somewhere in this book everything that he requires.

The book is extremely well edited, some of the best sections are contributed by the Editor, and in fact The Introduction is the best contribution to the book. Dr. Fairbairn may rest assured that his gigantic labour has not been in vain, and it is certain that he will earn the gratitude of any practitioner who has the foresight to acquire this Encyclopædia.

"The Causation of Fœtal Death: Report of Investigation into the Factors which determined Death in a Sample of Three Hundred Fœtuses of Viable Age." By EARDLEY HOLLAND, F.R.C.S., F.R.C.P. Reports on Public Health and Medical Subjects, No. 7, Ministry of Health. London: Published under the authority of H.M. Stationery Office. Price 10/- net.

THIS work, fathered by the Local Government Board under Sir Arthur Newsholme, was conceived in pre-war days, had a protracted gestation through the war-time, and a delivery so inexplicably delayed that fears were expressed that it might result in a still-birth and possibly maceration or mummification. These pessimistic views proved quite unfounded, as in this year of grace, 1922, there arrived to the Ministry of Health No. 7 of Reports on Public Health and Medical Subjects, a strong and lusty volume valued at 10/- net, and entitled as above, to which Sir George Newman, as sponsor, gives a start off in the shape of five pages of his best.

It embodies the result of Dr. Eardley Holland's investigation of the cause of death in 300 fœtuses from the Lying-in and General Hospitals of London, and forms a valuable contribution to preventive medicine, and particularly that branch of it comprised in the practice of midwifery. It is so packed with interesting matter that it is difficult to make a selection for detailed notice.

The final section, giving the author's conclusions, shows what he considers the most important results of his research, and may be summarized as follows:—That syphilis has been given an exaggerated prominence in the causation of still-birth; so far from being the cause of somewhere about 50 per cent. of still-births, it is responsible for under 20 per cent. (actually in this research 16 per cent.). Another unexpected discovery is the frequency of cranial injuries of fœtuses that died during labour—no less than 48 per cent.,—and of the marked proportion that occurred in uncomplicated breech deliveries. More fœtuses were killed by the complications of labour than died during pregnancy from maternal and placental disease.

In considering the prevention of fœtal death in view of his findings in these 300 cases, Dr. Holland reckons that about half the fœtal deaths are preventable, and of these about 20 per cent. (of which three-quarters are due to syphilis) could be prevented by ante-natal methods alone, about 12 per cent. (chiefly toxæmias and complications of labour) by combined ante-natal and intra-natal methods, and about 20 per cent. (complicated labour) by intra-natal methods alone, the most promising—in order of success likely to be obtained—being, the complications of labour, syphilis, and the toxæmias of pregnancy. This leads to the final and most definite conclusion of all, that the most urgent reform is the improved training of the medical profession; fœtal mortality will not be appreciably lowered till the standard of midwifery skill is raised.

Perhaps the most original and suggestive part of this monograph is the discussion on the effects of excessive stress on the cranial contents with an analysis of 81 cases of tearing of the tentorium and sub-dural hæmorrhage.

By reflecting the scalp and taking away part of the parietal bone, so as to allow the cerebral hemisphere to be removed and the septa to be seen, the effects of alterations in the shape of the head on the tentorium and falx were observed. By compression antero-posteriorly the middle two-thirds of the falx is pulled upwards by the vault and stretched, and, owing to its attachment to the tentorium below, causes tension in the tentorium. When the head is compressed between the vault and the base, as in face and brow presentations, the free border of the tentorium and the lower free border of the falx are stretched, whilst the remainder of the falx

becomes slack owing to the lowered elevation of the cranial vault. If the bending of the bones is too great, tearing of the septa occurs at the point of greatest tension. That the septa form a defensive system against excessive alterations in the shape of the fœtal head is shown by the strengthening bands and fibres arranged along the lines where stress is likely to fall during moulding of the head. A full description with diagrams of these strengthening bands and the relations of the veins and venous sinuses to the septa is given and compared with the post-mortem findings in the septa of dead fœtuses to show how tearing varies with the compression in different presentations and positions of the head. The origin of the sub-dural hæmorrhage was also investigated. The mechanism by which this frequent form of cerebral hæmorrhage in intra-natal fœtal death is produced is very clearly described as arising from the vein of Galen becoming kinked at its entrance into the straight sinus by the drawing up of the apex of the tentorium. The engorgement of the vein of Galen and its tributaries is a very striking feature in cases of torn tentorium and it is easy to understand how very slight tension of these distended veins will result in their rupture, followed by extensive sub-dural hæmorrhage Rupture of the vein of Galen itself was only detected twice; the rupture having occurred at the fixed point of its entrance into the straight sinus, whereas hæmorrhage from the tributaries from the cerebellum and mid-brain were frequently found. A careful analysis is given of the 81 cases of tearing of the septa found among the 167 fresh fœtuses examined; they are divided into two main groups: those in which the fœtus was delivered by the head (46 cases), and those in which it was delivered by the breech (35 cases). Of the 46 cephalic deliveries, one was a face presentation ending naturally, and one a brow presentation terminated by forceps. Of the 44 cases of vertex presentations, 25 were delivered by forceps and 19 naturally. The 19 cases of natural delivery are analyzed, but in many of them no adequate explanation for the septal laceration is offered. Dr. Holland is inclined to suspect that over-zealous guarding of the perineum which forces the occiput against the symphysis may be a possible explanation in some cases. Though in 25 cases delivered by forceps the force exerted to effect delivery was often unavoidable owing to special complicating conditions, such as pelvic contraction, prolapse of the cord and placenta prævia, in which the fœtus had to be delivered rapidly, Dr. Holland regrets the large number in which the forceps was applied merely for a prolonged second stage, due to a posterior position of the occiput or uterine inertia; he considers that the production of sufficient cranial stress to make the tentorium tear means either that the force was excessive or was applied in the wrong diameter of the head, or both, and concludes by saying that if the forceps is responsible for the saving of many fœtuses it is also responsible for the unnecessary death of, and injury to, many others; it is used too often on the flimsiest indications. A table is given containing details of the 81 cases of torn tentorium.

The immediate bearing of the investigation on practice is constantly illustrated. For instance, the mistakes commonly made in the treatment of placenta prævia and responsible for much of the fœtal mortality are summarized as :—

"(1) Over-treatment. Some cases, with only slight hæmorrhage require no treatment beyond rupture of the membranes.

(2) Internal version. The indications for this operation are very limited; the cord often prolapses during its performance. Much better is external version, followed by bringing down a leg.

(3) Too rapid delivery. This is usually as dangerous for the mother as for the fœtus. I believe it accounts for the majority of the avoidable fœtal deaths. Once hæmorrhage is controlled the delivery of the fœtus should be the slowest possible."

In breech presentations, however, the most striking criticisms of the usual management are found. In all except two of the 16 cases of fresh fœtuses dead as the result of uncomplicated breech delivery, signs of excessive cranial stress, tearing of the tentorium and cerebral hæmorrhage were found, and Dr. Holland interprets this as showing that it is wrong to hasten the delivery of the aftercoming head. His view is that the head is subjected to a sudden and severe stress by being forcibly dragged through a vulval orifice only moderately distended by the passage of the body of the fœtus, and he pleads for greater deliberation and gentleness in the delivery of the aftercoming head, and advocates episiotomy to diminish the pressure on the head. The explanations of the cause of cranial stress in uncomplicated breech and vertex cases are scarcely convincing; efforts to save the perineum must surely be of a specially violent order to produce the effects described.

The incidence rates in this series must be checked by comparison with material obtained from the general practice of the country. Except for three cases it was entirely obtained from hospitals and infirmaries, with an undue proportion of disordered pregnancies and complicated labours and a higher standard of midwifery practice than the average throughout the country.

The points touched on in this notice will serve to show the practical value of this excellent piece of research, for which all working in and teaching obstetrics will be grateful to Dr. Holland and on which we heartily congratulate him. The Report is one which should have the widest possible circulation, and our chief regret is that the congenital inability of a Government department to do the thing thoroughly has led to the spoiling of the ship for a ha'porth of tar by fixing a price so exorbitant as to limit its usefulness. Though but 150 odd pages enclosed in cardboard backs, it has tables and plates in colour, is well printed, and labelled with the cryptic message, 'For Official Use,' but none of these merits explains why Whitehall cannot realize that research is not only worth paying for but that its results should be made readily available by making the tax as light as possible to those with the desire to learn.

JOHN S. FAIRBAIRN.

"A Manual of Midwifery." By Professor W. E. FOTHERGILL, M.A., B.Sc., M.D. Fifth Edition. Edinburgh: W. Green and Sons, Ltd. Price, 10/-

THIS little book will appeal to the student on account of its convenient size and lucid style. The reading is pleasant and the author manages to avoid that dull verbiage which is so characteristic of the average scientific manual. The illustrations are good and clear, and there are many diagrams which materially assist in explaining the text. The matter in the letterpress is emphasized by carefully-considered use of heavy type. At the end of various sections short summaries are given in convenient form for cramming for examination. These qualities will assure it a wide popularity when it is compared with the large tomes on obstetrics which have recently made their appearance.

The section on the evolution of forceps is most interesting historically, but not of much practical value to the accoucheur.

The author gives a full and admirable account of sectional anatomy, and lays stress on this as an exact method of studying the phenomena of labour. The reviewer thinks that there is a great possibility that rigor mortis may have some effect on the relations of different structures, and confesses that he is not convinced by the author's "proof" that during the birth of a "vertex," flexion and extension

of the head do not occur. After having knocked out the "wedge" and "lever" theories with the greatest of ease, he gives as the true cause:—"The anterior wall of the pelvis is smooth and short, the bony structures being lined by thin soft tissues. The posterior wall is long and lined by elastic and muscular tissue. Any part of the fœtus which is in contact with the anterior wall is thus exposed to much less resistance than parts passing over the posterior wall. This accounts for the more rapid descent of the anterior part in all presentations and mechanisms, and, for dipping of the occiput, known as flexion, in cases of vertex presentations." Later in the book he overlooks the finality with which he did this, but in describing third and fourth vertex presentations which undergo long rotation, he omits to explain how it is, that the posteriorly-placed occiput descends more rapidly than the sinciput.

This is not the only occasion when he fails to stick to his guns. Much time is spent discussing the "general fluid pressure," and proving that the contents of the gravid uterus act as a fluid mass, so that contraction of the uterus forces its contents along the line of least resistance; yet later in the book he gives anteversion of the uterus as a cause of delay in the first stage, as "the force of the uterus is so misdirected that dilatation is not produced."

Again, in the early part of the book he states that separation of the placenta occurs through the "deep portion of the compact layer, the spongy layer remaining behind." Towards the end of the book he advises the removal of the placenta through "the proper plane—that is, the spongy layer!"

On other occasions points which appear to the reviewer to be trivial he emphasizes with unnecessary fervour; such as: "It is desirable to measure the patient's waist over the skin. This measurement is usually a little less than the measurement taken over the clothes at the same place. The measurement over the clothes should really be a little larger than that taken over the skin!"

The toxæmias of pregnancy are separated from eclampsia proper, eclampsia being classified as "Complex Labour." Both sections are clearly and concisely put, and the treatment is fully described in an up-to-date form.

Ante-natal examination of the patient is lightly touched on in twenty lines, with one page on pelvimetry. Routine examination to ascertain whether there is disparity between the head and the brim is not mentioned—not even among the indications for induction, which are dismissed in twelve lines. Routine examination of the urine is mentioned, but is given no prominence. He seems to take it for granted that the accoucheur sees the patient for the first time after labour has started. The author bemoans in his preface that he has been impressed by the trifling nature of the advances in Midwifery. The reviewer cannot help feeling that some advances have been made in the ante-natal branch of the ancient art. Most authorities now lay great stress on it, as a means of preventing many abnormal labours. A few pages on this subject would be more valuable to both student and practitioner than the history of the evolution of forceps, or the full account of Bossi's dilators—which surely are rather obsolete. Perhaps this teaching accounts for transverse presentation occurring in Manchester once in 240 cases.

His treatment of "Transverse" seems a little brusque: "In all cases version . . . If version is impossible, embryotomy." Surely the treatment depends on the cause. Under certain conditions might not this abnormality find a place under the mighty roll of the indications for Cæsarean section?

In spite of these discrepancies, the book is likely to enjoy an even greater popularity than the four previous editions, and in the reviewer's opinion it will not be long before the author will have the opportunity of revising his book again for the sixth edition. L. L. R.

BOOK REVIEWS.

"The Practitioner's Encyclopædia of Midwifery and the Diseases of Women." Edited by JOHN S. FAIRBAIRN, M.A., B.M., B.Ch. (Oxon.), F.R.C.P. (Lond.), F.R.C.S. (Eng.). Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton, 1921. 950 pages. Price £3 3s.

THE Editor has designed this book with the intention of assisting to close the gap which unfortunately has existed and still exists between the art of midwifery and that of the treatment of the diseases peculiar to women, and his efforts in this direction have been most successful. The Editor, in his introduction, reminds the reader how often in the past it was assumed that it was right and proper to profess a knowledge of gynæcology without any equivalent knowledge of midwifery, and quotes the case of a surgeon who, when applying for a gynæcological appointment, airily boasted that all he had seen of obstetrics was "one abortion and two after-births." Such ideas, however, are anything but ancient, and the modern surgeon, without the knowledge of midwifery that he had and which he forgot soon after passing his final examination is considered by many, and not infrequently by himself, to be a fit and proper person to treat women for the diseases peculiar to their sex because he has attained the manual dexterity to remove an ovarian cyst with a twisted pedicle ." No one who has not been through the obstetric mill in a maternity hospital or general practice can have the judgment demanded by many of the problems presented by the diseases of women."

The Encyclopædia is divided into seven parts.

Part I deals with the Life History of the Female Reproductive Organs, and includes sections on Anatomy, Development and Physiology, by Dr. R. W. Johnstone, Dr. Nepean Longridge, and Mr. T. G. Stevens.

Part II deals with Normal Reproduction, and contains one of the best sections in the book, that on Hygiene and Management, by Dr. J. W. Ballantyne, whilst that by Dr. Haig Ferguson on The Application of Hospital Methods to Private Midwifery Practice is full of sound common sense, very helpful, and does not strive after the unattainable.

Part III is concerned with Abnormal Reproduction and Abnormal Labour. The sections on the Toxæmias of Pregnancy, by the late Mr. Gordon Ley, only serve to emphasize the loss to Obstetrics and Gynæcology by the untimely death of this brilliant young expert. This part also includes General Diseases Complicating Pregnancy, with sections on Syphilis, by Mr. John Adams, Abortion by Mr. Clifford White, and an extremely good article on Ectopic Pregnancy by Dr. Russell Andrews. Ante-partum and Post-partum Hæmorrhage is dealt with, under Abnormal Labour, by Dr. Blacker in the judicial manner which one always expects in his writings. Dr. Robert Jardine, with his unique experience of eclampsia, has contributed an illuminating article on Eclamptic Convulsions, and the sections on the General Considerations of Delayed and Obstructed Labour and the Deformities of the Bony Pelvis by Professor Munro Kerr still further enhance the reputation of this great authority on these subjects. The Editor concludes with a most useful Summary of Abnormal Pregnancy and Labour.

Part IV deals with The Infant, and the Editor has been fortunate to include in

the list of his contributors such an enthusiastic worker and authority as Dr. Eric Pritchard, whose sections on The Physiological Principles underlying Management, Artificial Feeding, Management of Premature Infants and Complications During the First Month of Life, cannot fail to interest the practitioner and be of the greatest service to him in his work.

With Part V commences the second portion of the Encyclopædia, dealing with Diseases of Women. In the first section the Editor contributes most useful articles on the Symptoms Complained of by Patients and their Investigation, Methods of Examination and Observation of the Patient, whilst as an indication of the thoroughness of this book may be mentioned the articles on Bacteriological and other Laboratory Methods, by Dr. W. C. Topley, The Cystoscope, by Mr. Harold Wilson, and X-Rays, by Dr. Robert Knox. The article on Uterine Hæmorrhage in the section dealing with the Disturbances of Function and Symptoms of Disease, by Professor Beckwith Whitehouse, stands out as a masterly exposition. In Section V an article by Professor W. E. Fothergill on Obstetrical and Other Injuries, is very clear and full of sound common sense.

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The final section, giving the author's conclusions, shows what he considers the most important results of his research, and may be summarized as follows:—That syphilis has been given an exaggerated prominence in the causation of still-birth; so far from being the cause of somewhere about 50 per cent. of still-births, it is responsible for under 20 per cent. (actually in this research 16 per cent.). Another unexpected discovery is the frequency of cranial injuries of fœtuses that died during labour—no less than 48 per cent.,—and of the marked proportion that occurred in uncomplicated breech deliveries. More fœtuses were killed by the complications of labour than died during pregnancy from maternal and placental disease.

In considering the prevention of fœtal death in view of his findings in these 300 cases, Dr. Holland reckons that about half the fœtal deaths are preventable, and of these about 20 per cent. (of which three-quarters are due to syphilis) could be prevented by ante-natal methods alone, about 12 per cent. (chiefly toxæmias and complications of labour) by combined ante-natal and intra-natal methods, and about 20 per cent. (complicated labour) by intra-natal methods alone, the most promising—in order of success likely to be obtained—being, the complications of labour, syphilis, and the toxæmias of pregnancy. This leads to the final and most definite conclusion of all, that the most urgent reform is the improved training of the medical profession; fœtal mortality will not be appreciably lowered till the standard of midwifery skill is raised.

Perhaps the most original and suggestive part of this monograph is the discussion on the effects of excessive stress on the cranial contents with an analysis of 81 cases of tearing of the tentorium and sub-dural hæmorrhage.

By reflecting the scalp and taking away part of the parietal bone, so as to allow the cerebral hemisphere to be removed and the septa to be seen, the effects of alterations in the shape of the head on the tentorium and falx were observed. By compression antero-posteriorly the middle two-thirds of the falx is pulled upwards by the vault and stretched, and, owing to its attachment to the tentorium below, causes tension in the tentorium. When the head is compressed between the vault and the base, as in face and brow presentations, the free border of the tentorium and the lower free border of the falx are stretched, whilst the remainder of the falx

becomes slack owing to the lowered elevation of the cranial vault. If the bending of the bones is too great, tearing of the septa occurs at the point of greatest tension. That the septa form a defensive system against excessive alterations in the shape of the fœtal head is shown by the strengthening bands and fibres arranged along the lines where stress is likely to fall during moulding of the head. A full description with diagrams of these strengthening bands and the relations of the veins and venous sinuses to the septa is given and compared with the post-mortem findings in the septa of dead fœtuses to show how tearing varies with the compression in different presentations and positions of the head. The origin of the sub-dural hæmorrhage was also investigated. The mechanism by which this frequent form of cerebral hæmorrhage in intra-natal fœtal death is produced is very clearly described as arising from the vein of Galen becoming kinked at its entrance into the straight sinus by the drawing up of the apex of the tentorium. The engorgement of the vein of Galen and its tributaries is a very striking feature in cases of torn tentorium and it is easy to understand how very slight tension of these distended veins will result in their rupture, followed by extensive sub-dural hæmorrhage Rupture of the vein of Galen itself was only detected twice; the rupture having occurred at the fixed point of its entrance into the straight sinus, whereas hæmorrhage from the tributaries from the cerebellum and mid-brain were frequently found. A careful analysis is given of the 81 cases of tearing of the septa found among the 167 fresh fœtuses examined; they are divided into two main groups: those in which the fœtus was delivered by the head (46 cases), and those in which it was delivered by the breech (35 cases). Of the 46 cephalic deliveries, one was a face presentation ending naturally, and one a brow presentation terminated by forceps. Of the 44 cases of vertex presentations, 25 were delivered by forceps and 19 naturally. The 19 cases of natural delivery are analyzed, but in many of them no adequate explanation for the septal laceration is offered. Dr. Holland is inclined to suspect that over-zealous guarding of the perineum which forces the occiput against the symphysis may be a possible explanation in some cases. Though in 25 cases delivered by forceps the force exerted to effect delivery was often unavoidable owing to special complicating conditions, such as pelvic contraction, prolapse of the cord and placenta prævia, in which the fœtus had to be delivered rapidly, Dr. Holland regrets the large number in which the forceps was applied merely for a prolonged second stage, due to a posterior position of the occiput or uterine inertia; he considers that the production of sufficient cranial stress to make the tentorium tear means either that the force was excessive or was applied in the wrong diameter of the head, or both, and concludes by saying that if the forceps is responsible for the saving of many fœtuses it is also responsible for the unnecessary death of, and injury to, many others; it is used too often on the flimsiest indications. A table is given containing details of the 81 cases of torn tentorium.

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(2) Internal version. The indications for this operation are very limited; the cord often prolapses during its performance. Much better is external version, followed by bringing down a leg.

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In breech presentations, however, the most striking criticisms of the usual management are found. In all except two of the 16 cases of fresh fœtuses dead as the result of uncomplicated breech delivery, signs of excessive cranial stress, tearing of the tentorium and cerebral hæmorrhage were found, and Dr. Holland interprets this as showing that it is wrong to hasten the delivery of the aftercoming head. His view is that the head is subjected to a sudden and severe stress by being forcibly dragged through a vulval orifice only moderately distended by the passage of the body of the fœtus, and he pleads for greater deliberation and gentleness in the delivery of the aftercoming head, and advocates episiotomy to diminish the pressure on the head. The explanations of the cause of cranial stress in uncomplicated breech and vertex cases are scarcely convincing; efforts to save the perineum must surely be of a specially violent order to produce the effects described.

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JOHN S. FAIRBAIRN.

"A Manual of Midwifery." By Professor W. E. FOTHERGILL, M.A., B.Sc., M.D. Fifth Edition. Edinburgh: W. Green and Sons, Ltd. Price, 10/-

THIS little book will appeal to the student on account of its convenient size and lucid style. The reading is pleasant and the author manages to avoid that dull verbiage which is so characteristic of the average scientific manual. The illustrations are good and clear, and there are many diagrams which materially assist in explaining the text. The matter in the letterpress is emphasized by carefully-considered use of heavy type. At the end of various sections short summaries are given in convenient form for cramming for examination. These qualities will assure it a wide popularity when it is compared with the large tomes on obstetrics which have recently made their appearance.

The section on the evolution of forceps is most interesting historically, but not of much practical value to the accoucheur.

The author gives a full and admirable account of sectional anatomy, and lays stress on this as an exact method of studying the phenomena of labour. The reviewer thinks that there is a great possibility that rigor mortis may have some effect on the relations of different structures, and confesses that he is not convinced by the author's "proof" that during the birth of a "vertex," flexion and extension

of the head do not occur. After having knocked out the "wedge" and "lever" theories with the greatest of ease, he gives as the true cause:—"The anterior wall of the pelvis is smooth and short, the bony structures being lined by thin soft tissues. The posterior wall is long and lined by elastic and muscular tissue. Any part of the fœtus which is in contact with the anterior wall is thus exposed to much less resistance than parts passing over the posterior wall. This accounts for the more rapid descent of the anterior part in all presentations and mechanisms, and, for dipping of the occiput, known as flexion, in cases of vertex presentations." Later in the book he overlooks the finality with which he did this, but in describing third and fourth vertex presentations which undergo long rotation, he omits to explain how it is, that the posteriorly-placed occiput descends more rapidly than the sinciput.

This is not the only occasion when he fails to stick to his guns. Much time is spent discussing the "general fluid pressure," and proving that the contents of the gravid uterus act as a fluid mass, so that contraction of the uterus forces its contents along the line of least resistance; yet later in the book he gives anteversion of the uterus as a cause of delay in the first stage, as "the force of the uterus is so misdirected that dilatation is not produced."

Again, in the early part of the book he states that separation of the placenta occurs through the "deep portion of the compact layer, the spongy layer remaining behind." Towards the end of the book he advises the removal of the placenta through "the proper plane—that is, the spongy layer!"

On other occasions points which appear to the reviewer to be trivial he emphasizes with unnecessary fervour; such as: "It is desirable to measure the patient's waist over the skin. This measurement is usually a little less than the measurement taken over the clothes at the same place. The measurement over the clothes should really be a little larger than that taken over the skin!"

The toxæmias of pregnancy are separated from eclampsia proper, eclampsia being classified as "Complex Labour." Both sections are clearly and concisely put, and the treatment is fully described in an up-to-date form.

Ante-natal examination of the patient is lightly touched on in twenty lines, with one page on pelvimetry. Routine examination to ascertain whether there is disparity between the head and the brim is not mentioned—not even among the indications for induction, which are dismissed in twelve lines. Routine examination of the urine is mentioned, but is given no prominence. He seems to take it for granted that the accoucheur sees the patient for the first time after labour has started. The author bemoans in his preface that he has been impressed by the trifling nature of the advances in Midwifery. The reviewer cannot help feeling that some advances have been made in the ante-natal branch of the ancient art. Most authorities now lay great stress on it, as a means of preventing many abnormal labours. A few pages on this subject would be more valuable to both student and practitioner than the history of the evolution of forceps, or the full account of Bossi's dilators—which surely are rather obsolete. Perhaps this teaching accounts for transverse presentation occurring in Manchester once in 240 cases.

His treatment of "Transverse" seems a little brusque: "In all cases version . . . If version is impossible, embryotomy." Surely the treatment depends on the cause. Under certain conditions might not this abnormality find a place under the mighty roll of the indications for Cæsarean section?

In spite of these discrepancies, the book is likely to enjoy an even greater popularity than the four previous editions, and in the reviewer's opinion it will not be long before the author will have the opportunity of revising his book again for the sixth edition. L. L. R.

"A Course for the Obstetric Manikin" (Die Geburtshilfliche Phantomkurs), with 165 pen-and-ink sketches, for doctors and students. By Dr. WILHELM LIEPMANN, Extraordinary Professor of Diseases of Women in the Frederick-William University of Berlin. Berlin: Urban and Schwarzenberg, 1922. Price, 450 marks (in paper covers), 585 marks (bound).

THE author employs a pelvis with leather covering and a vulvar diaphragm for operative manœuvres, and Sellheim's mounted pelvis to demonstrate the mechanism of labour.

The author emphasizes the importance of practice on the manikin:—"Practice on the manikin is as indispensable for the practitioners as the war game is for the officer. War is not ever with us and births are too few. To be prepared is, in the case in question, to be victorious." The whole course is divided into seven sections, and the various manœuvres are described in great detail and are illustrated by pen-and-ink sketches. Chloroform is recommended during operations; "it is free from danger in midwifery."

All the operations (with the exception of some cases of version) are performed and illustrated in the dorsal position. This is a drawback for those schools in which the lateral position is adopted. The author recommends protecting the perineum with the points of the thumb and fore and middle fingers. This, however, gives less support than those digits and the palm applied flat.

Names are given to the various sizes of the os. Thus, "engagement-ring" for 2 cm., "ladies' watch" for 3 cm., "gentleman's watch" for 5 cm., these objects being actually illustrated. An 8 cm. os is said to be the size of a "hand-plate," a 6 cm. os of a "small hand-plate."

Throughout the work the author insists on the importance of asepsis, of patience and care. "Every internal examination is an interference of importance, and may be dangerous to life. It is only justified when external examination is insufficient or where there is urgent danger to mother and child." "No operation without an accurate diagnosis made by one finger, or by two, or by the whole hand." "The forceps must not be applied before the cervix is completely dilated"; "the high forceps is no operation for the practitioner." Rotation with the forceps is not permissible, "the forceps is a tractor, not a screw-driver." For the obstetrician time is relative: "the pains are the obstetrician's watch."

In the description of the delivery of the after-coming head the author makes a slight slip when he writes, "one hand goes into the mouth of the child." He is opposed to the use of the forceps to the after-coming head by a general practitioner. If the head cannot be delivered by traction the head should by no means be cut off: "one should never saw through the branch on which one sits."

In eclampsia, the author thinks the quickest delivery (by vaginal Cæsarean section) is best. He warns against the use of Bossi's dilator in the alliterative line; "with 'Bossi' it is budge or burst."

Under the heading of Embryotomy no mention is made of cleidotomy.

This handbook is an admirable and trustworthy guide for students and practitioners, and should be read by every obstetrician. The advice is sound and the note serious, lightened in many places by pithy and witty aphorisms. Special praise is due to the numerous pen-and-ink sketches by Miss Elizabeth Krause, which are (with a few minor exceptions) drawn with great skill and accuracy and add greatly to the value of the work.

In an appendix the author gives a brief history of obstetrical operations.

In the chapter dealing with Cæsarean section the author states that Jeremias Trautmann, of Wittenberg, performed the first Cæsarean section on a living patient on April 21st, 1610. This is an error. Not to mention Jacob Nufer's operation on

his own wife in 1500, Scipio Mercurio in 1571 saw two women in Toulouse who had been operated on by Cæsarean section, which, he says, at that time was as well known in France as bleeding for headache in Italy. H. R. S.

"Obstetric Nursing." Text-book by Miss CAROLYN CONANT VAN BLARCOM. London: Macmillan and Co., 1922. Price, 15/- net.

MISS VAN BLARCOM'S book, *Obstetrical Nursing*, strikes a note of originality—at any rate, on the shelves of a British nurse's library. It is full of interest, both from the professional point of view, and also for the insight it gives one of American methods and customs. The book is well written and arranged, and deals with the subject in an advanced and scientific manner, at the same time being eminently practical The author, in her preface, explains the reasons for writing the book: To infuse into nurses, old or new, "the never-ending wonder and beauty of the great mystery of birth and the miracle of the beginning of a new life." Two reproductions of Gari Melcher's beautiful pictures help to convey this sentiment. "To widen the outlook of nurses by describing the underlying principles which are employed in maternity hospitals of recognized excellence in different parts of America and Canada." And to teach how the rather elaborate "hospital procedures may be adapted to meet the requirements of the patient's own home, whether in a city or rural community."

The book is divided into seven parts.

Part I. The anatomy and physiology of the female pelvis and generative organs; and a very descriptive section, with diagrams, dealing with the breasts.

Part II. The development of the fœtus is dealt with more fully than in most text-books of midwifery for nurses; many will doubtless appreciate this.

Part III. The expectant mother, and a chapter on mental hygiene, which is written with much sympathetic insight.

Part IV. The description of the birth of the baby is very sketchy from a British midwife's point of view, but as American nurses are not expected to conduct delivery, except in emergencies, no doubt this brevity was intentional.

Part V. The puerperium. A graduated system of exercises to be used in bed and later is described; and there is also an interesting chapter on nutrition.

Part VI. The maternity patient in the community. A description of American pre-natal and post-natal work.

Part VII. The care of the baby. This section is disappointing when compared with the excellence of those preceding it. The list of articles required for preparing an artificial feed is so long that it would be a very convincing argument in favour of breast feeding.

There are one or two procedures that cannot be passed without a note of criticism:—"The treatment for concealed accidental hæmorrhage consists of emptying the uterus speedily." "The treatment for an *unconscious* eclamptic patient is to give as much fluid as possible by dropping it into her mouth from the point of a teaspoon." The number of sterile cloths and sheets and their elaborate arrangement for a normal labour looks very well in a picture, but the reality is often otherwise. A patient will not, and cannot be expected to, keep still, and so prevent disarrangement of the towels during a long second stage, or there may be times when the second stage is so short that proper application of and draping with towels will be impossible.

The whole book gives satisfaction. The paper and type are excellent, and most of the numerous illustrations will be new and fresh to nurses, many being taken from extremely good photographs; their help in explaining many practical details cannot be over-estimated. BARBARA NEVILL.

"Dosage Tables for Deep Therapy." By Professor FRIEDRICH VOLTZ. Edited by REGINALD MORTON, M.D. William Heinemann, 10/6.

THE Editor, or rather translator, in the preface writes that "it has been established beyond all question that any technique not based on the use of a homogenous radiation cannot be accurate as regards dosage, and cannot be followed by results that are either uniform or the best attainable." He mentions, further, the indebtedness that radiologists have towards the Germans.

Writing of complete accuracy in X-ray dosage we are glad he takes into account the variability and complexity of the human organism.

We gather from his preface that he looks upon the rays of short wave lengths used by the German radiologists, as Gamma rays, and, of course, in this we differ from him. Unfortunately the X-rays so far produced have not reached the end of the spectrum where Gamma rays are found and a much higher voltage than that so far produced by any apparatus, even the Germans, will be needed. On the physical side they have scored, and we can understand Dr. Morton's enthusiasm. But even in our opinion the Erlangen school has been outdistanced and Dr. Voltz's little book is already lagging behind. The work of Professor Dessauer and his assistants to-day appears to lead the way.

Dr. Morton speaks of "the unfortunate antagonism to the new technique," and of the courage of those who adopt it. All good things need fighting for. The test of time and the results of previous experience must be balanced against new ideas. Briefly put, the dosage tables prepared by Dr. Voltz are for use with homogenous rays filtered through thicker filters than generally used—namely, .5 mms. of zinc—based on the Seitz-Wintz biological system of measurement. The unit skin dose of Seitz and Wintz is explained and the ratio of absorption of individual tissues is dogmatically tabulated. Methods of measurements are gone into, the ionto-quantimeter being dismissed in two pages. Also the Kienbock's strips and the salenium cell.

Most of the book is taken up by the dosage tables, with short instructions as to their use. The fifth and last chapter advises on the management of the X-ray apparatus and tubes.

The book is not only worth reading, but needful to those interested in deep therapy, and Professor Voltz's little volume is a milestone on the road on which deep therapy is rapidly moving towards a true scientific status. We congratulate Dr. Morton on his effort and wish it success. GEO. VILVANDRÉ.

REPORTS OF SOCIETIES

THE ROYAL SOCIETY OF MEDICINE.

Section of Obstetrics and Gynæcology.

Meeting of the Section held on October 5th, 1922.
Dr. T. W. Eden, President, in the chair.

Dr. Arthur E. Giles showed a specimen of a large

Fibroid arising in the cervical stump after subtotal hysterectomy.

In 1915 Dr. Giles performed subtotal hysterectomy for large multiple fibroids of the uterus in a patient 39, the left ovary being preserved. A year later a pelvic swelling the size of a billiard-ball, was felt; in 1917 this swelling was again felt, but as there were no symptoms operation was not advised. In 1922 the tumour was found to have much increased in size and was accompanied by symptoms of pelvic pressure. At operation the tumour was found to be a fibromyoma arising from the cervical stump; the tumour was removed and the cervical stump was dissected out. On histological examination the tumour proved to be an ordinary fibromyoma. The development of a fibroid in the cervical stump after subtotal hysterectomy was a very rare occurrence. In an experience of 1,000 hysterectomies for fibroids, the majority of which were subtotal, Dr. Giles had not previously come across such a case.

Dr. Herbert Spencer said a considerable number of cases of development of fibroids in the cervical stump after amputation of the uterus had been published. It was only another instance of the advantage of total hysterectomy, which he had practised exclusively for the last 22 years, and had on many occasions recommended to the Section. The occurrence of fibroids in the stump was, of course, not so common as the occurrence of cancer, which was said by some to be "rare." Seeing that one American gynæcologist had collected 276 instances of the occurrence of cancer in the stump in the practice of American gynæcologists alone, and that William Mayo, of Rochester, had recently published his opinion that total hysterectomy was the better operation, he hoped that more members of the Section would become convinced of its superiority over the partial operation. After total hysterectomy, leaving the vagina widely open for drainage, prevented those exudates and accumulations of blood which were met with in Dr. Giles's case, and were not uncommon after subtotal hysterectomy. He asked how Dr. Giles treated the vagina.

Dr. Arthur E. Giles read a paper on

Indications and results of myomectomy for uterine fibroids (see page 608).

Mr. Victor Bonney read a paper on

The scope and technique of myomectomy (see page 591).

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

Meeting held in Liverpool, October 20th, 1922.

Mr. HAROLD CLIFFORD (Manchester), the President, in the Chair.

Six new members of the Society were unanimously elected.

Mr. W. W. KING (Sheffield) showed a specimen of Krunkenberg tumour of the ovary together with microscopic sections. He proposed to publish the case in full when some further information had been obtained.

Professor BLAIR BELL said that he was much interested in Dr. King's rare specimen for he himself had had an exactly similar case which he had described as "Bilateral carcinomatous sarcoma" before the Royal Society of Medicine in January, 1912, the case having been operated on in April, 1911. At the time there was considerable discussion as to the nature of the tumour. The Pathological Committee of the Royal Society of Medicine examined the sections and issued a report stating that, in their opinion, the growth was a sarcoma. Professor Blair Bell alone differed from this view and adhered to his original description. In July, 1912, Professor Blair Bell again brought the tumour before the Royal Society of Medicine, for the patient had died of recurrences and these were typically adenocarcinomatous in nature. The Pathological Committee on that occasion issued a curious report to the effect that although the original tumour was sarcomatous, the secondary metastases were carcinomatous. This time Dr. Glendenning agreed with the exhibitor of the specimen that the tumour was malignant and contained both sarcoma and carcinoma.

Of recent years there has been a tendency to regard these tumours as carcinomatous, but Professor Blair Bell still thought that they were compound malignant tumours, and the lantern slides from his case, which he again showed after an interval of ten years, exactly resembled the illustrations of Dr. King, which in Professor Blair Bell's opinion undoubtedly showed the presence of sarcomatous elements in close relation with carcinomatous cells. He did not think that the sarcomatous appearance of the stroma was due to hyperplasia of the connective tissue cells owing to the great irregularity in the size and shape of the nuclei. He hoped that Dr. King, when publishing his case, would give a complete survey of the literature up to date and drop the German name he had given to the tumour.

Dr. BRIGGS (Liverpool) showed specimens of

OVARIAN FOLLICULAR CYSTS.

1. An ovarian follicular blood-cyst 3 in. by 3½ in., in the right ovary removed on September 22nd, 1922, from a woman aged 48, 19 years married, two children, aged 15 and 9 years; two abortions in the last nine years. Menstruation 4-5/28.

On the 21st September, 1922, she was sent to Liverpool with little or no local discomfort—there was pressure on the rectum—but with a rather free continuous uterine hæmorrhage of three months' duration, preceded by seven slightly excessive menstrual losses and, taking her back ten months, November, 1921, an omitted menstrual period.

It was not the history of an ectopic gestation and ovarian enlargement was confined to one side—the right side. A bilateral appendage operation was done: there was both recent and old blood in the pelvic peritoneal cavity amidst almost general adhesions.

2. It is seldom that an ovarian follicular cyst becomes universally adherent except in cases of pelvic infection.

The cyst, 3 in. by 3½ in., of the right ovary here shown, removed on September 25th, 1922, from a young married woman aged 28 years, had not exceeded the size debatable by operators. Locally there were tenderness, fixation and pressure symptoms of a peritonitis possibly due to colon infection of the cyst leakages.

The corresponding Fallopian tube was healthy, also the left ovary and tube. Menstruation had been normal. The patient, two years ago, had once aborted during the sixth month of pregnancy.

Dr. DONALD (Manchester) was of opinion that the cysts described by Dr. Briggs, were really adenomyomta of the ovary.

Dr. WILLETT (Liverpool) referred to the question of ovarian cysts as a cause of post-climacteric hæmorrhage. He could recall three cases in which a small ovarian dermoid or follicular cyst led to slight continuous metrostaxis, there being no disease of the uterus on pathological investigation after removal. The explanation was doubtless to be found in the renewal of ovarian activity consequent on new growth of the ovary.

Dr. BRIGGS, in reply, thought that Dr. Donald's opinion as to the nature of these cysts was probably correct and suggested further examination by a Pathological Committee. He urged that in the activities of the Society such a committee should be kept active and alive at its job, otherwise valuable pathological evidence would be doubtfully acceptable and, when doubt existed, both sides should be heard.

Dr. DANIEL DOUGAL (Manchester) showed a specimen of

OVARIAN DERMOID WITH SMALL DERMOID IN THE GREAT OMENTUM.

The patient was a married woman, 47 years of age. Menstruation was regular and of normal amount up to the menopause four years ago.

She had five children, the last now ten years of age, and had no difficulty with any of her labours.

Her only symptom was inability to pass urine and the bladder had been catheterized for a week before I saw her.

On examination I found a cystic tumour filling the pelvis and displacing the uterus forwards and upwards. A diagnosis of ovarian cyst was made and she was admitted to hospital.

I operated two days later, and on opening the abdomen found a right ovarian cyst, the size of a fœtal head, filling the pelvis and lightly adherent to uterus and rectum. The uterus and opposite ovary were quite normal.

After removing the tumour I inspected the nightbourhood of the appendix and found a portion of omentum adherent to the cæcum and containing two yellowish coloured nodules, the larger about the size of a pigeon's egg. I thought these were of tuberculous origin and removed the piece of omentum containing them. After the operation I examined the specimens and found that the ovarian tumour was thin-walled dermoid with the usual fatty contents and also a little hair. The larger omental tumour also proved to be a dermoid, had a fairly thick wall and was stuffed with hair. The smaller nodule was a calcareous gland.

Dermoid cysts of the omentum are of rare occurrence and have generally resulted from the implantation of tumour cells after rupture of a similar growth in the ovary. In such cases they have usually had the appearance of surface grafts, the hair when present sprouting out from the surface of

the omentum. In the present case there was no evidence of the rupture of the cyst although it is quite possible some leakage may have occurred as a result of injury during labour. The fact that the omental cyst was single, had a thick complete wall and was imbedded in the substance of the omentum is, I think, strongly in favour of its being an independent growth.

Randall and Lawrence[1] have reported a case of ovarian dermoid with secondary cysts connected with the omentum but leakage into the abdominal cavity appeared to have occurred from tapping of the cyst, and the secondary dermoids were obviously implantation grafts. In the pathological report on the same case Lawrence was able to give particulars of eight cases published up to that time (1908) where dermoid tumours were present in the abdomen in association with a similar tumour in the ovary. The secondary cysts were usually multiple and there were firm and extensive abdominal adhesions so that there was strong evidence that the primary tumour had been damaged and the contents disseminated over the abdomen.

Dr. DANIEL DOUGAL (Manchester) also described a case of

PRIMARY CARCINOMA OF THE VAGINA TREATED BY HYSTERO-VAGINECTOMY.

The PRESIDENT congratulated Dr. Dougal on his successful case. The operation must have been a very difficult one.

Dr. BRIGGS recalled his own experience in support of the free local removal of an epithelioma of the vagina : it was the essential : the method need not be criticized as it must be adapted to requirements.

Dr. BURNS (Liverpool) showed specimens of

(*a*) UTERUS WITH MULTIPLE FIBROIDS.

W. H., æt. 44 years; no pregnancies; married 21 years. Menstruation 16 years, 5/28; dysmenorrhœa, severe leucorrhœa; L.M.P. 18/8/22. Complaining pain in back, swelling in abdomen. She had known of this swelling for years. For the past two years the periods have been becoming more frequent and lasting longer than usual. Recently there has been some frequency of micturition.

Examination : abdomen : tumour can be felt in mid-line reaching about half an inch above the umbilicus. It is nodular.

Bimanual : cervix small and hard, the supra-vaginal portion seems larger than usual. Tumour continuous with cervix.

Operation : Uterus enlarged and full of fibroids. Both appendages normal. Supravaginal hysterectomy performed.

The uterus is seen to be enlarged, the cavity is filled with submucous and polypoid fibroids. The lowest member of the series had just begun to dilate the internal os and acted as a ball valve. When the uterus was opened a quantity of clear glairy fluid escaped. In the fresh state the fibroids were fascetted upon one another and formed a complete cast of the uterine cavity.

(*b*) INTERSTITIAL ECTOPIC PREGNANCY.

A. H., æt. 35 years, one child, one miscarriage, two and one half years ago. Menstruation 13 years, 3/28, regular; L.M.P. 5/3/22.

First came under observation 7/3/22 complaining of bleeding every two weeks for the past two months. Indefinite history of having missed a period.

1. Ref. Randall and Lawrence, *Trans. Roy. Soc. Med., Obstet. Sect.*, 1908, i, p. 105.

Examination: abdomen: slight tenderness in right side of pelvis. Bimanual: uterus small, in good position; right appendage tender; left normal; small amount of blood p.v.

7/4/22. Examination: uterus small, small swelling can be felt in the right cornua like a small fibroid, tender. Still complains of losing at intervals.

Kept under observation until 30/5/22, when she was admitted to hospital. During this period the only change in the pelvic condition noted was a slight increase in the size of the cornual swelling. The uterine bleeding continued at intervals but was never profuse. There was no history of having passed anything.

Operation 1/6/22. Abdomen opened in the mid-line. Uterus normal in size and position. Small oval swelling in the right cornua involving the uterine end of the Fallopian tube. On the upper surface of this swelling there was a small thin-walled cyst containing dark blood. This ruptured under manipulation. Left tube and ovary normal. Pelvis clean; no blood in cavity. In order to remove the tumour it was necessary to cut deeply into the uterine cornua. The resulting cavity which did not open the uterine cavity was closed by deep sutures.

The pathological report states the tumour to be an ectopic gestation. From its position it would appear to be in the interstitial portion of the tube—a type which is comparatively uncommon.

Two interesting points in the history are (1) The absence of pain; (2) history of bleeding for six months before coming under observation.

Dr. BRIGGS considered Dr. Burns' specimen one of isthmial pregnancy as shown by the relative site of the round ligament; the specimen ought to be preserved in a teaching department to demonstrate that the usual early intraperitoneal rupture may not occur when the boring villi are more active in the utero-ligamentary direction as in this case.

Dr. LEITH MURRAY (Liverpool) showed a specimen of

SARCOMA OF THE LEFT OVARY IN A GIRL AGED 19 YEARS.

This unusual specimen of unilateral sarcoma of the ovary, together with the opposite ovary and uterus, was removed from a girl aged 19, on 24th June last.

When seen for the first time two days previously she appeared to be an extremely healthy girl and had been indulging in gymnastic exercises and tennis within a few days.

She had noticed a swelling in the abdomen for seven weeks, and for six weeks had had a little occasional pain in the left side of the abdomen. She was quite sure that the swelling was increasing almost from day to day. There had been no loss of wight.

The chest was examined in the ordinary routine way before anæsthetic, but nothing abnormal was made out.

Operation revealed a soft, bossy, reddish, solid ovarian tumour of the left side, weighing 5¼ lbs. There were no adhesions and no free fluid. Secondary nodules and glands were absent. An ounce or two of recent red blood in the pelvis was obviously due to a local rupture of the lower pole of the tumour, resulting from bi-manual examination under the anæsthetic; the fingers were felt to penetrate the mass whilst testing for mobility.

The uterus and other ovary were removed at the same time, but both proved normal microscopically.

On 2nd July she began to complain of severe pain in the left scapular region, and there appeared a swelling behind the left clavicle. Three days later Dr. Cuthbert Matthews, who was called in consultation, found evidence of a mediastinal growth pushing the heart forward against the chest-wall and leading to partial collapse of the bases of both lungs. He found no fluid in the pericardial or pleural cavities.

Professor Ernest Glynn reports as follows:—"The tumour is most probably an alveolar sarcoma. The cells appear too small to be epithelial cells and the columnar arrangement at the margin is suggestive of an alveolar sarcoma. I think the growth in the ovary is secondary." He further states that tumours of this variety frequently arise in the neck and mediastinum.

Dr. G. C. Mort reports that she died on 13th October with secondary growths in the skin of the chest and abdomen and with severe headache and optic neuritis, indicating cerebral involvement.

Dr. LEITH MURRAY also showed a specimen of

INTRALIGAMENTARY FIBROID WEIGHING 10½ LBS. AND SHOWING ADVANCED NECROBIOTIC CHANGES.

The specimen was removed on 10th January, 1922, from a woman aged 49, who had had five children, the last nine years ago. She was a short woman and exceedingly stout. Her periods had been regular (4/28) and the last occurred one week previously.

The remarkable feature of the case lies in the fact that she had no idea there was any lump in the abdomen. Her only complaint was a pain in the back which she imagined to be "kidney disease," and for which she consulted Dr. Dow, of St. Helens. Urinary trouble and rectal symptoms were absent. She had been doing all her household work without any assistance.

The operation was unusually difficult as the result of immense veins found in the capsule. Both ureters were obvious on the surface of the cavity left after enucleation. A subtotal hysterectomy with removal of both appendages was carried out. The body of the uterus lay above the umbilicus and the cervix was greatly elongated and stretched over the anterior surface of the mass.

The patient made an uninterrupted recovery.

Dr. FLETCHER SHAW (Manchester) described a case of

OCCLUSION OF THE RECTUM FOLLOWING THE ADMINISTRATION OF A SIMPLE ENEMA.

The PRESIDENT referred briefly to a somewhat similar case. The patient had an eclamptic fit when 7½ months pregnant, and was delivered the following day of a still-born fœtus by natural forces. The next day three grains of calomel were given, followed in a few hours by a simple enema. Nine days later a recto-vaginal fistula was observed, and on further examination under anæsthesia a cast of the rectum was removed. Six days after this colotomy was performed by a surgeon who subsequently excised the damaged part of the rectum and joined the upper part of the anal canal through an incision over the sacrum. Later the colotomy was closed and the patient has not had any trouble since.

Dr. LEITH MURRAY reported

A CASE OF UNSUSPECTED PREGNANCY.

Several cases of unsuspected pregnancy have been recently detailed in

the *British Medical Journal*. In view of its medico-legal importance it appears advisable to record a case of this nature.

I was asked to see Mrs. C., aged 24, on 30th July, 1920, by Dr. A. C. Ransome, of Birkenhead. Twenty-nine hours previously she had been delivered of a 6½ lbs. child, apparently at term. She had been happily married for three years and had during most of that time lived in Newfoundland, where she developed enteric fever. As a result of this acute illness she lost three stones in weight, but during recent months was pleased to find that she was, as she thought, "picking up." Her menses had always tended to be scanty and infrequent, and there was complete cessation for some time following the enteric fever. She gave, however, a very precise history of having had a more or less monthly loss throughout the whole of her nine months of pregnancy, of such duration and quantity as to lead her to believe she was menstruating. She had had no vomiting, had felt no movements and had no idea whatsoever that she was pregnant. Between the seventh and eighth months she announced to her mother that her abdomen was getting very big. Her mother promptly asked her whether she was pregnant, but on hearing of these "menstrual periods" and of the total absence of any other symptoms, told the daughter there could be nothing of the kind.

For a few weeks before her return to Birkenhead she had been with her husband on the South Coast, bathing, dancing and golfing. Neither of them had any objection to parenthood, and, as they were well-to-do, there was no reason why arrangements should not have been made for the baby.

She and her husband arrived at Birkenhead on 27th July, to be present at a dinner celebration given by the husband's parents. Very many other members of the family had also arrived, and she and her husband had to be accommodated in a high-class Boarding House. While walking thither late in the evening of 28th July, she complained to her husband that she had eaten something at dinner which had disagreed with her, and the following morning, as she still had pains in the abdomen, her husband advised her to stay in bed whilst he proceeded to Liverpool on business.

The abdominal pains increased in severity, and at 10.30 a.m. she discovered that delivery was imminent. She was unable to attract attention, and delivered herself unaided at 11 a.m. The placenta was delivered normally, but there was considerable bleeding thereafter.

My presence was necessitated by rather severe lacerations of the vagina, which were leading to continuous oozing. These lacerations were sutured under an anæsthetic and healed well.

The child's palate was scored in several places by the mother's nails in her attempts to expedite delivery.

It was noticeable that there were very few striæ on the abdomen. She appeared to be rather big-boned but certainly not fat. Her height was about 5 ft. 6 ins. She was a well-educated and intelligent girl and her distress at the lack of provision for her offspring was very obvious.

Dr. BRIGGS thought that psycho-analysis was more appropriate than pure obstetrics to the unsuspected occurrence of pregnancy related by Dr. Leith Murray.

Dr. LEITH MURRAY also narrated

A CASE OF SIMULATED DISEASE.

The main interest of this case lies in the fact that a girl of twenty

should have succeeded, by producing diapers artificially stained, in deceiving her mother, her doctor and a consultant into believing that she was menstruating excessively.

She was brought to me on the 1st August, 1919, with the request that I should remove the uterus.

Her periods, which began at 15, were reported regular (3/28) until she went to school at 16. Three months of amenorrhœa ensued, followed, the report went, by severe and prolonged periods ever since. For months at a time she was supposed to be only a few days free from loss in each month.

She had been curetted on 25th April, 1919, without any improvement, and had been given thyroid, hamamelis, calcium lactate and ergot.

On examination she proved to be a slim little girl, rather pale than otherwise but not excessively so. She was highly neurotic and rectal examination, which showed a normal pelvis, was only made with extreme difficulty.

As she was not bleeding on the day when seen I asked for a diaper to be sent me. This was received on 14 August and presented an appearance remarkably like menstrual staining. There was, however, no trace of blood detectable by the benzidine test. Two other specimens of blood passed into the chamber were received on 16th and 18th August and were sent for analysis. The report is as follows :—" The colouring matter is due to the presence of a dye very analogous to cochineal, and may possibly be one of the present-day substitutes for it. Both specimens are similar in character and undoubtedly consist of urine to which some colouring matter has been artificially added."

It seems strange that a girl who would go to such lengths for purposes of deception had not sufficient cleverness to send actual specimens from a menstrual period.

When challenged by her mother she admitted having on one occasion only used cochineal from the kitchen cupboard to colour the diaper.

The last I heard of her was that her mother considered she had been very unkindly treated by myself and was endeavouring to find someone who would remove the uterus.

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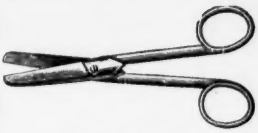
C1008.
Towel Clips,
7 in., **9/6**

C312. **Operating Outfit and Sterilizer Combined.** Complete **£3 10 0**

C320 **Aseptic Pocket Case.**
Complete **£3 3 0**

C186. **Artery Forceps.**
Screw or Aseptic joint.
4½ and 5 in., **3/0** 5½ in,, **3/6**
6in., **4/0** 7 in., **5/0**

C353. **Scissors.**
Collin's joint.
4½ in., **2/3** 5 in., **2/6**
6 in., **3/0** 7 in., **4/6**



C351. **Scissors.**
4½ and 5 in., **2/0** 6 in., **2/6**
7 in., **3/6** 8 in., **4/6**

C1002. **Towel Clips.**
Curved or straight.
3½ in., **3/6**
per doz., **36/0**

C216 **Ochsner-Mayo Artery Forceps,**
6½ in., **6/6** 6½ in., **8/6**

C218 **Ochsner-Mayo Artery Forceps,**
6½ in., **5/6** 7½ in., **7/6**

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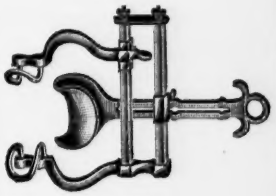
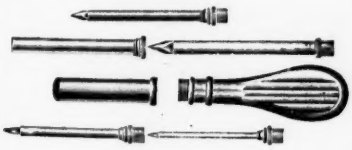


C521
Balfour's Retractor.
3 bladed.
35/0



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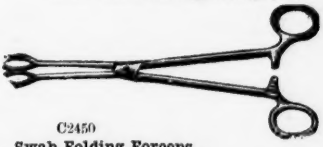

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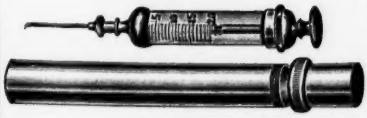

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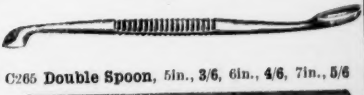
20 mm. or 1 cc. **8/6** 2 cc. **10/6** 5 cc. **15/0** 10 cc. **18/0** 20 cc. **25/0**

C6760 **Sterilizing Forceps, 6/6**



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C278 **Magnetised Eye Spud, 3/6**

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When introduced into the vagina the gelatin shell disintegrates; the compressed wool tampon expands, carrying the medicated cone upward against the cervix, where it slowly dissolves, thus affording a continuous application to the inflamed and congested mucous membrane of the entire vaginal tract, not possible by any other means.

By mechanical expansion not only are the vaginal folds distended, thus assuring complete medication, but the **Tampon** raises and supports the uterus, thus relieving the venous congestion, thereby correcting displacements.

As a means of applying local treatment in **Gonorrhœa, Endometritis, Cervicitis, Vaginitis, Leucorrhœa, Dysmenorrhœa, Prolapsus Uteri, &c.,** Pontampons present the most **Simple and Satisfactory** method.

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A—ICHTHYOLATUM (ICHTHYOL COMPOUND)

Glycerin and Boro-Glyceride base, 50%; Ichthyol, 2·5%; Iodine, ·14%; Carbolic Acid, 5%; Powdered Hydrastis, 1%.

This combination was adopted after a careful study of the consensus of opinion of leading Gynæcologists. It is antiseptic, stimulating and astringent. It causes an increased flow of secretions and relieves venous congestion, softens and relaxes adhesions, and has a favourable influence upon pelvic exudates, diseased tubes and ovaries, and upon pelvis and abnormal pains. Headaches and other reflex symptoms are often relieved or cured by this method.

B—ICHTHYOL, 10%

Glycerin and Boro-Glyceride base, 50%

This form softens adhesions and promotes absorption, and has been found invaluable in inflammatory conditions of the tubes and ovaries and in pruritis.

C—PROTARGOL AND ICHTHYOL (each 2%)

Glycerin and Boro-Glyceride base 50%

Acts as an antiseptic and astringent, and is particularly valuable in gonorrhœa and its complications. It diminishes the discharge, prevents extension, and hastens the absorption of exudates.

D—OPIUM BELLADONNA, AND HYOSCYAMUS

Glycerin and Boro-Glyceride Base, 50%; Opium, 2 grs.; Belladonna, 1 gr.; Hyoscyamus, 2 grs.

This Tampon is indicated when a sedative and anodyne is needed, as in the acute stage of pelvic peritonitis, vesical, vaginal, and uterine pains as well as those caused by disease of the tubes and ovaries.

In cases of painful menstruation, the Tampon should be used for several days preceding the period. If employed in this manner the severity of the pains will be much lessened.

E—GLYCEROLE OF TANNIN, 50%

A valuable astringent and anti-hæmorrhagic. Also useful in cases of prolapse and as a soothing astringent in cases of erosion, irritation and leucorrhœa. When this Tampon is used, the patient must exercise care, as it stains the clothing.

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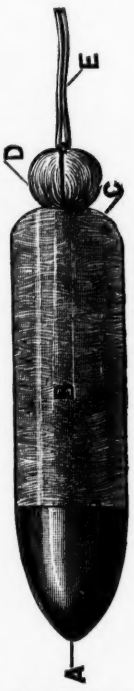

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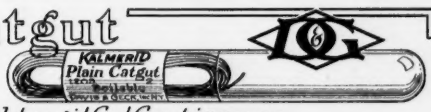

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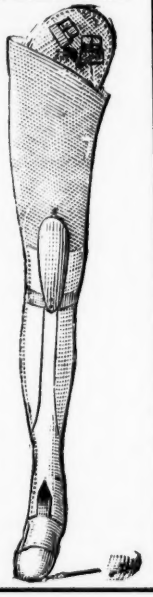

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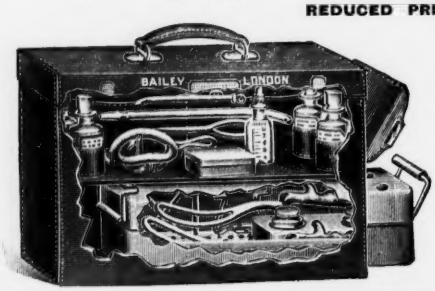

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